THE FOUNDRY

A TRADE JOURNAL

DEVOTED TO THE INTERESTS OF THE WHOLE FOUNDRY BUSINESS

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JULY, 1896.

Vol. VII. No. 47.

Published Monthly by THE FOUNDRY PUBLISHING CO.

DETROIT, MICH.

ESTABLISHED 1879.

WE HAVE TAKEN ADVANTAGE OF SLOW BUSINESS THE PAST TWO MONTHS TO COMPLETELY OVERHAUL OUR PLANT, AND WILL START IN FULL TIME JUNE 1st.

THE MOST COMPLETE CONCERN OF ITS KIND IN THE COUNTRY.

Our Product will be in Quality

EQUAL TO THE BEST,

And our Prices will be the Lowest.

WHEN IN NEED OF ANYTHING
THE FOUNDER USES, EXCEPTING
ONLY METAL AND FUEL,
GET OUR PRICES.

Our Royal Plumbago Ad. Last month took well. Here are a few more bargains

Radiant Brand East India Silver Lead, Three Cents per Pound.

E. I. Ingot Mold Wash, Three Cents per Pound.

The J. D. Smith Foundry Supply Co.

Foundry Equippers,
Manufacturers of
Foundry Facings,
Blackings and Supplies.

CINCINNATI, OHIO.
U. S. A.

REFINERS OF

PLUMBAGO

and Black Lead.

THE BEST IS THE CHEAPEST

WHEN YOUR FOUNDRY INTERESTS
ARE TO BE CONSIDERED

WE MANUFACTURE

THE BEST

East India Plumbago
India Silver Lead
Founders Perfect Wash
Foundry Facings
Foundry Supplies.

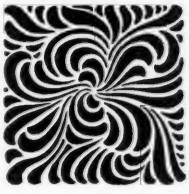
TRIAL SAMPLES FREE.
ALL GOODS GUARANTEED.

THE S. OBERMAYER CO.

CINCINNATI,

CHICAGO, ILL. LARIMER, PA. WHITE HAVEN, PA.

SOME CUPOLAS BURN OUT



More than others, and then the Maker, Melter or Foundry Foreman has to take the blame.

All this could be avoided and much expense, annoyance and profanity spared, if the Foundrymen of the country knew what some of them know, viz: that

MICA SCHIST

IS superior to anything known for the purpose of lining Cupolas, Steel Crucibles, Hot Air Furnaces, Large Ladles, etc. It burns hard under heat, and does not expand, scale off or fall out like some fire brick. It can be easily broken to size, the crumbs and small pieces mixed up with a little fire clay, and used as a mortar with which to lay up brick wall.

We can supply it in almost any required size.

Price, F. O. B. Quarrie, $1.00 to $2.00 per ton.

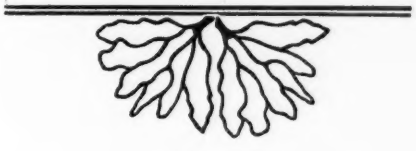
J. W. PAXSON & COMPANY,

Pier 45. **PHILADELPHIA, PA.**

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Casting.

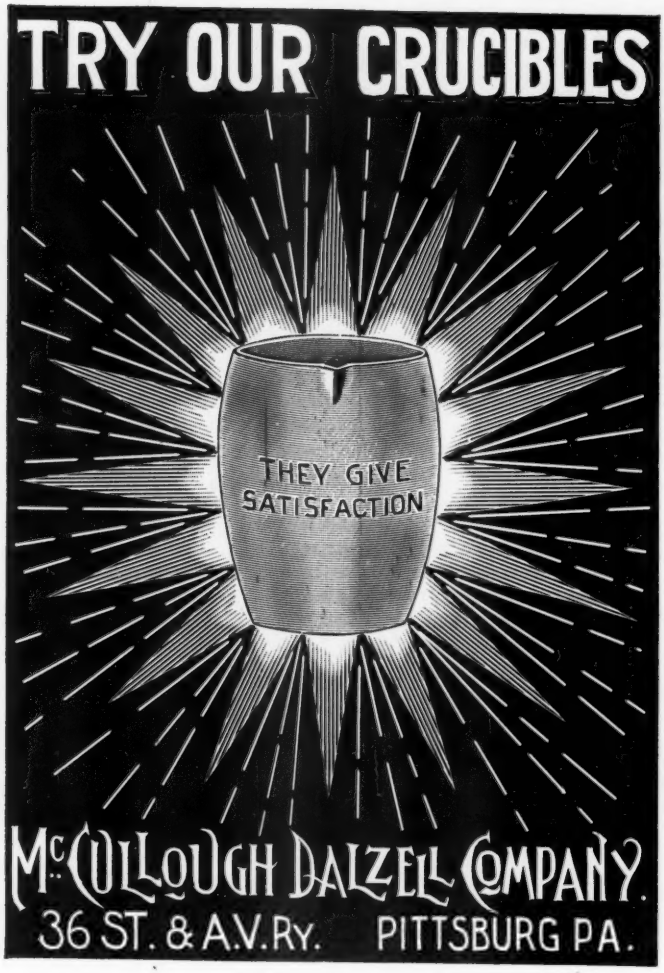
537=39 West 27th St.,
NEW YORK.

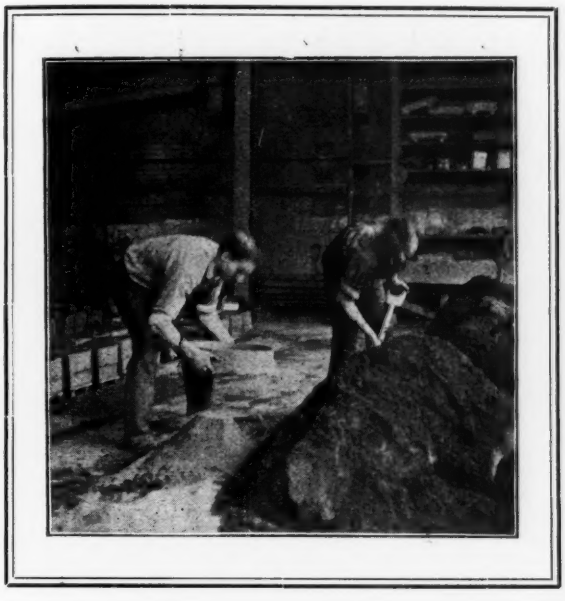
Providence Office,
42 S. Water Street.

Buffalo Office,
70 and 72 Columbia St.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I.
WATERFORD, N. Y.
ALBANY, N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.


TRY OUR CRUCIBLES
THEY GIVE SATISFACTION
McCULLOUGH DALZELL COMPANY.
36 ST. & A.V.RY. PITTSBURG PA.



SAND!

TO SAY THAT A MAN

"HAS NO SAND"

is to refer to him in a decidedly uncomplimentary manner. Nearly as bad to say that his sand is no good. When referring to us, however, our friends—that is to say, our customers—always grow enthusiastic. . .

THE REASON WHY

We mine and ship more sand than any concern in the Eastern or Central States is simply because, when we get a customer once, he is ours for good. We see that he gets exactly what he wants and that it's free from every kind of impurity.

SAMPLES AND PRICES GIVEN ON APPLICATION.

Twelve Years' Experience In Mining and Shipping SAND and CLAY, enables us to ship you just what you need. We can send you any grade of MOLDING SAND you may require, from the finest to the coarsest, and guarantee quality always the same. Our No. 1 Sand has no superior that we know of for Stove Plate, Hollow Ware, Grey Iron and Malleable Castings; our No. 4 is the best Sand in use for Heavy Castings of any kind. It is an extra good wearer and is always sure to turn out a perfect casting. Our Crude Plastic Fire Clay is very refractory and guaranteed to work plastic readily in water.

E. M. AYERS ✻ MARKET BLOCK, ZANESVILLE, O

Crucible.

Crucible

Dipper.

Cover.

Stopper.

Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; Small Crucibles for making Assays and fine pure Plumbago for lubricating, etc.

We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

We make All Sizes, from 8 oz. to 2 ton Capacity.

ROBT. J. TAYLOR & SON,

1900 to 1916 CALLOW HILL STREET, PHILADELPHIA, PA.

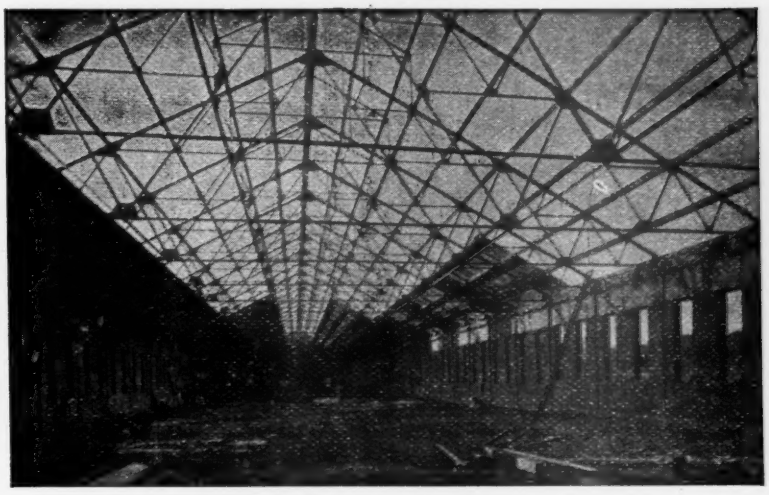
Wrought Iron Bridge Co.,

DESIGNERS AND BUILDERS IN
IRON AND STEEL
FIRE PROOF BUILDINGS

FOUNDRIES, MACHINE SHOPS
—FOR—
ETC., ETC.

Exterior of Foundry of Warder, Bushnell & Glessner Co., Springfield, Ohio.

Traveling and Jib Cranes for handling
Heavy Castings and Machinery.



Buildings Designed for Special
Requirements.

Interior Foundry Building of Warder, Bushnell & Glessner Co., Springfield, Ohio.

The roof of this building was erected by the Wrought Iron Bridge Co., Canton, Ohio, and consists of steel trusses supporting wooden purlins to which matched and dressed sheeting is nailed for slating. Trusses being 18 ft. above the floor, the wood work of roof is out of danger from fire, while the cover being of slate a suitable cornice to protect the overhanging of roof from flying sparks, or heat from the burning of neighboring buildings, renders this structure absolutely fire proof, Windows are set in the sides of ventilator throughout its entire length, so that ample light and ventilation is insured.

Wrought Iron Bridge Co.

ADDRESS NEAREST OFFICE.

CANTON, O. KANSAS CITY, MO. CHICAGO, ILL.

136 Liberty St., NEW YORK.

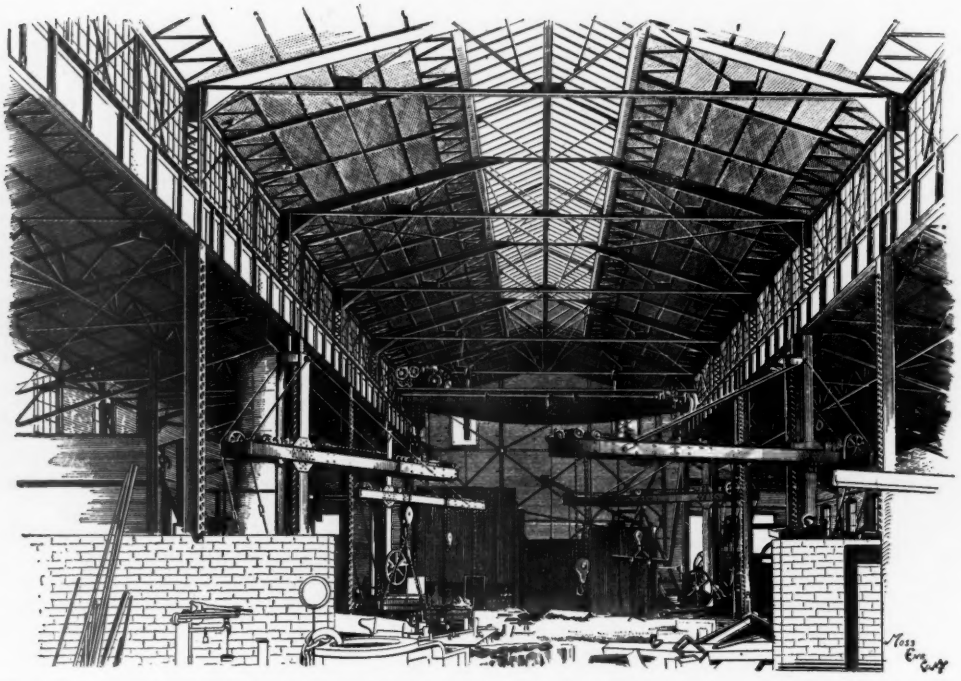
CHAS. M. JARVIS, President and Chief Engineer. BURR K. FIELD, Vice-President.
GEO. H. SAGE, Secretary F. L. WILCOX, Treasurer.

THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



The above illustration is taken direct from a photograph and shows the interior of a foundry building which was designed and built by us for S. F. Hodge & Co., at Detroit, Mich. Each wing is 24 feet in width and the central portion is 40 feet in width, this latter controlled by a crane with a travel the full length of the building. The crane girder posts are designed to carry jib cranes as shown. The roof is covered with our patent Anti-Condensation Corrugated Iron. The building is absolutely fire-proof, and the corrugated iron roof is guaranteed not to drip in the coldest weather.

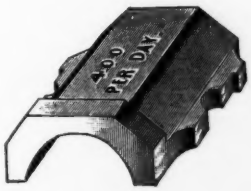
Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.

ONE MAN'S WORK

—WITH THE—

TABOR AUTOMATIC MOLDING MACHINE.



POURS CASTINGS TRUE TO PATTERN

MOLDS DO NOT BLOW

DUPLEX MACHINE.

Molds both parts of flask at one operation of machine, thus making two machines in one.

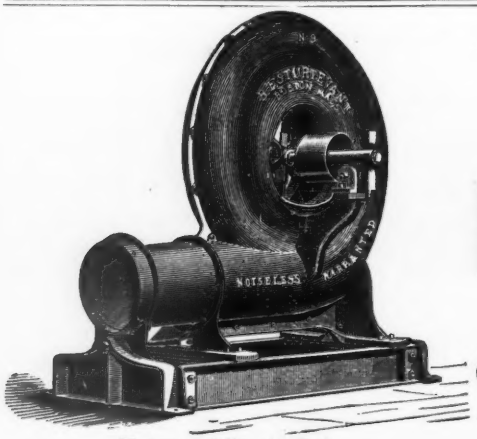
These machines are adapted to general castings when made in reasonable quantities.

The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth N. J., and see the machines in operation.

The Tabor Manufacturing Co.

OFFICE AND WORKS—
FRONT AND FRANKLIN STS. Elizabeth, N. J.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

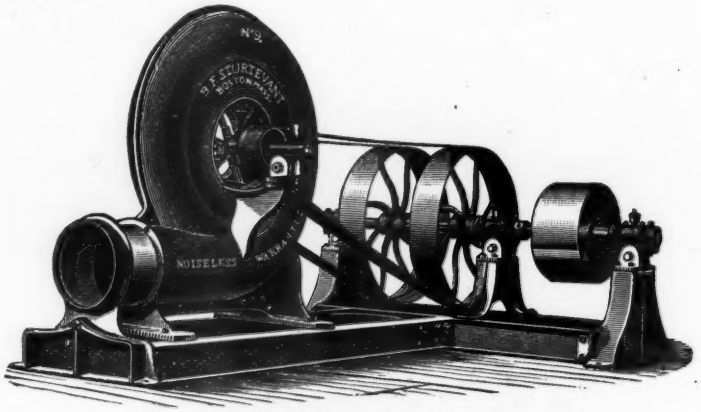
—FOR—

Cupola Furnaces and Forge Fires.

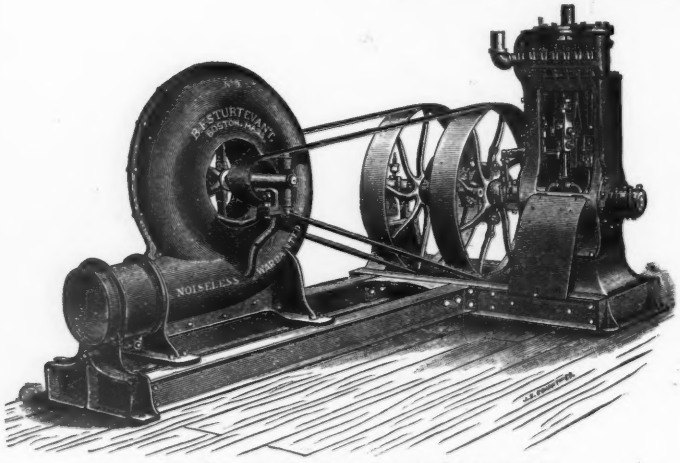
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

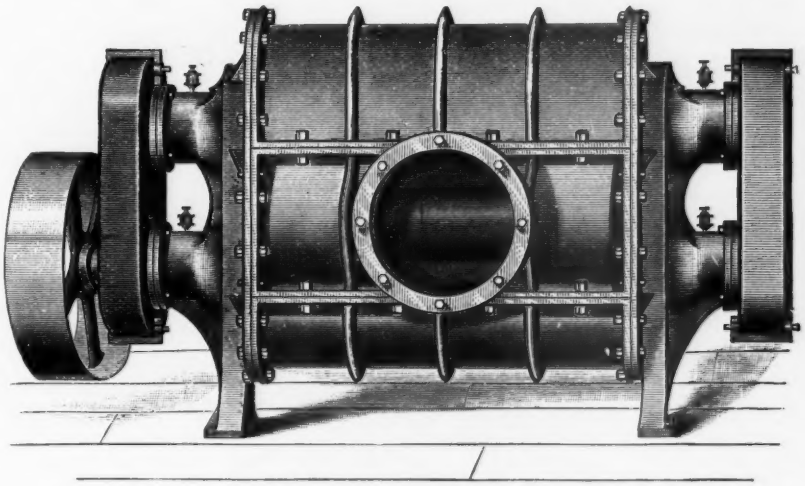
BOSTON, MASS.

91 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
16 S. Canal St. CHICAGO. 75 Queen Victoria St. LONDON.

STOCK CARRIED AT BRANCHES.

The Green Rotary Pressure Blower

GIVES THE MOST AIR FOR A $.



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

GIVES THE MOST AIR FOR A $.

SEND FOR CATALOGUE.

Wilbraham Baker Blower Co.,

2518 Frankford Ave., PHILADELPHIA, PA.

P. G. COCHRAN, Pres. JOHN H. WURTZ, Secretary
J. R. LAUGHREY, Treas. J. S. NEWMYER, Mgr.

Washington Coal & Coke Co

(CAPITAL PAID-UP $250,000.)

MANUFACTURERS OF

HIGH GRADE COKE

We Make a specialty of 72 Hour Foundry Coke.

N. P. HYNDMAN, Sales Agent,

Room 8, Conestoga Building, 7 Wood St.

General Office, DAWSON, PA. PITTSBURG, PA.

DIRECTORY OF LEADING PIG IRON DEALERS.

HUGH W. ADAMS & CO.

Pig Iron Merchants

15 Beekman Street, NEW YORK

Boston Office, 85 Water Street

HENRY H. ADAMS & CO.

(Incorporated)

PIG IRON

Sole Agents for the Celebrated "NORWAY," for combined Strength and Softness.

177 Broadway,
NEW YORK CITY, N. Y.

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,
Philadelphia.

THE DOMHOFF & JOYCE CO.

PIG IRON COMMISSION,

CINCINNATI.

CLINTON IRON & STEEL CO.

Manufacturers of the

CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

PITTSBURG, PA

15 Cortlandt St., NEW YORK.

DAYTON COAL & IRON CO.

(Limited.)

PIG IRON.

DAYTON, Tenn. CINCINNATI, Ohio.

F. A. GOODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

THE MARSHALL IRON

An old fashioned Pennsylvania Iron for high grade machinery.

The Juniata Furnace & Foundry Co.

Beach & Marlborough Sts.,

C. T. Holbrook, Sole Agent. PHILADELPHIA.

MILLER, WAGONER & BENTLEY,

PIG IRON.

Steel, Ore, Coke and Cinder.

Long Distance Telephone No. 842. COLUMBUS, OHIO.

PICKANDS, BROWN & CO.,

Manufacturers, Importers and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

ROGERS, BROWN & CO.

CINCINNATI, CHICAGO,

BUFFALO,

PHILADELPHIA, NEW YORK,

ST. LOUIS

SLOSS IRON & STEEL CO.

BIRMINGHAM, ALA.

SLOSS PIG IRON

D. L. Cobb, Sales Agent

1145 Monadnock Block, CHICAGO, ILL

A Good Thing is Always Appreciated!

Our design captured the order of the CHATTANOOGA FOUNDRY & PIPE WORKS, Chattanooga, Tenn. for . . . . . .

EIGHT ELECTRIC SWING CRANES

FOR THEIR PIPE FOUNDRY

If you have not investigated the merits of our Cranes, it will pay you to do so before placing orders.

The Phœnix Iron Works Co.,

WASON STREET, CLEVELAND, O.

Builders of Modern Cranes.

EASTERN OFFICE, H. W. JENNINGS, AGENT
FULTON AND CLIFF STS., NEW YORK.

NEW ENGLAND OFFICE, THE JOHN WALES CO.,
BOSTON, MASS.

CORRESPONDENCE SOLICITED.

MENTION THE FOUNDRY.

THE GREATEST MONEY SAVER
EVER OFFERED THE
FOUNDRY TRADE.

..King's Patent Sand Blast..

Every up-to-date foundryman knows the value of a sand blast for casting cleaning purposes. If he does not he is behind the times. The apparatus we furnish is the cheapest and best for either machinery or stove plate.

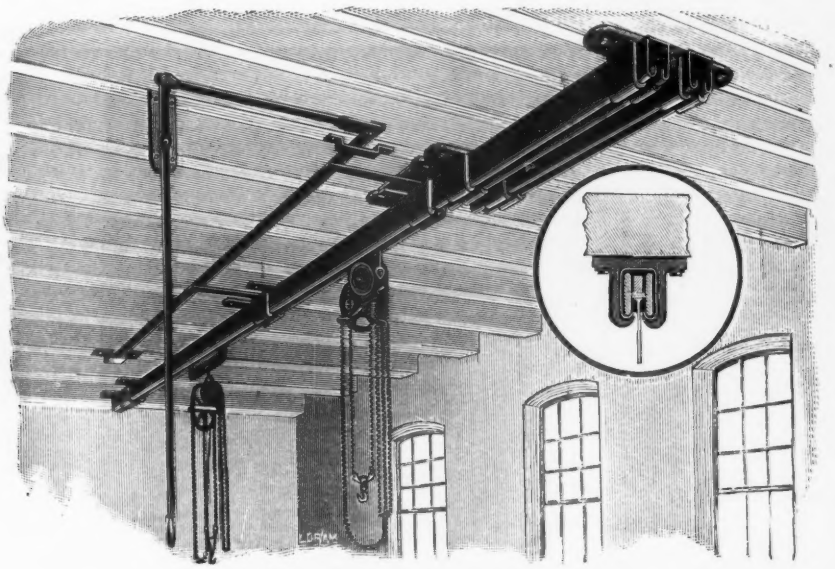
For cleaning Steel Castings it is invaluable. Stove Castings cleaned by it can be placed directly in the nickeling bath.

Pays for its cost in one month.

PRICE, $75.00

F. A. GOODRICH & CO.

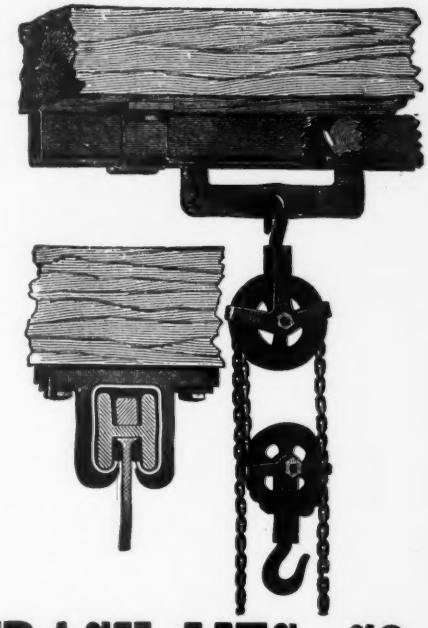
CHAMBER OF COMMERCE
DETROIT, MICH.



THE PATENT

Overhead Trolley Track System

Is the coming improvement in the iron foundries of this country and in many cases can be made to pay for itself in a few months.



Just the thing for

Carrying Iron from Cupola to Floors.
Carrying Castings from Floors to Cleaning Rooms. . . . .
Lifting, Rolling or Moving Flasks. .

All who have adopted this system have expressed themselves as being delighted with it.

Write us for Circulars, Estimates and Full Particulars.

COBURN TROLLEY TRACK MFG. CO.

HOLYOKE, MASS.

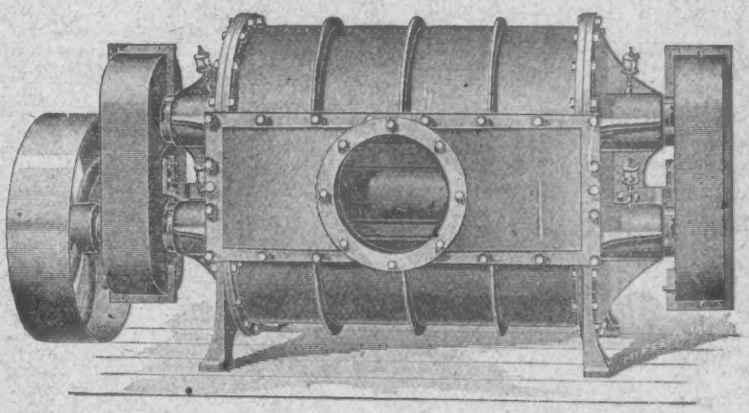
OVER

25,000

ROOTS' POSITIVE PRESSURE BLOWERS

Have been put on the Market.

1859



1896

They are Unequaled.

P. H. & F. M. ROOTS CO.

CONNERSVILLE, IND.

Just Enough Wind

∴ ∵ ∴ and at the right pressure for the best results is what you obtain with a

ROOTS' POSITIVE PRESSURE BLOWER

OUR CATALOGUE is interesting.
OUR TESTIMONIAL SHEET convincing.

WRITE FOR THEM

SATISFACTORY IN EVERY RESPECT. NO COST FOR REPAIRS.

DAYTON, OHIO, February 26th, 1895.

P. H & F. M. ROOTS CO., Connersville, Ind.:

Gentlemen—It gives us great pleasure to comply with your request for a statement of our experience with your Blower. We are using a No. 5 Blower driven by belt, and it is melting eight tons per hour in a forty-inch Colliau cupola. We think it safe to state, however, that the Blower would easily furnish sufficient wind to melt ten tons per hour. We have had it in use about three years, during which time it has cost us nothing for repairs, and we have found it very satisfactory in every respect.

Wishing you the continued success, which the good qualities of your machinery merit, we remain,

Yours truly,
THE STILLWELL-BIERCE & SMITH-VAILE CO.
By G. N. Bierce, Secretary.

NOT A PENNY FOR REPAIRS AND IN DAILY USE SINCE PURCHASED IN 1887.

MILWAUKEE, WIS., April 23, 1895.

P. H. & F. M. ROOTS CO., Connersville, Ind.:

Gentlemen—We are pleased to say that what we said on the 30th of December, 1887, is equally true at this date, as we have not spent a penny on the machine for repairs up to this time. The machine has been in daily use since purchased in 1887.

Yours truly,
THE EDWARD P. ALLIS CO.,
By Edwin Reynolds, Supt.

GIVES ENTIRE SATISFACTION.

HAMILTON, OHIO, May 8, 1895.

P. H. & F. M. ROOTS CO., Connersville, Ind.:

Gentlemen—We have been using Roots Blowers in our foundry since 1873, having put in larger ones from time to time. The present Blower, No. 6, has been in use for twelve years and is still working to our entire satisfaction. It is efficient, well built and has cost nothing for repairs since it was put in.

Yours truly,
THE NILES TOOL WORKS CO.,
R. C. McKinney, Treas. and Gen. Mgr.

P. H. & F. M. ROOTS CO.

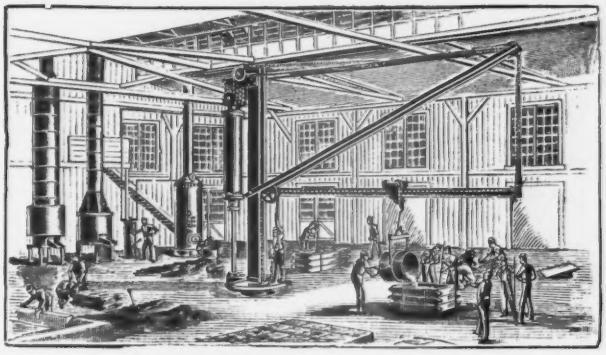
Connersville, Ind

EVER THAT SAME OLD WAIL

"CAN'T GET A NEW DOLLAR FOR AN OLD ONE"

Crowdin' you hard in prices, aren't they? Well, if you were smart enough to just half realize what a difference in your profits the Ridgway Balanced Steam-Hydraulic Crane in your foundry would make, the question with you wouldn't be, "I wonder if that Ridgway man tells the truth?" but, "Ridgway, my dear boy, how quick can we get the crane?"

Now, simply as a pointer, there's

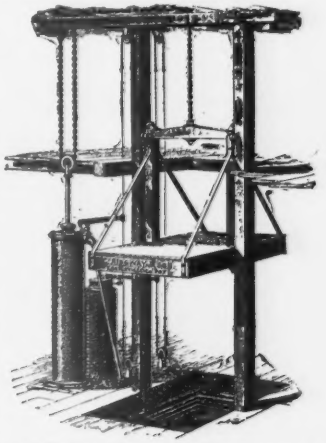


5-ton Steam-Hydraulic Crane in a Foundry.

The Henry McShane Mfg. Co.,

of Baltimore, Md. This is one of the newest and largest foundries in the land. You will believe it must be big when we tell you that one of their cupolas melts 30 tons per hour. Takes some orders to keep ahead of a cupola like that, don't it? However, no use of a long story. Of course this concern has adopted the Ridgway Crane. Establishments like this are run by men who know a thing or two. No, we never went near them. Never bothered them to buy the Ridgway Crane, anymore than we have bothered you. They did their own investigating, with the usual result and the same old cry goes up—"Ridgway, hurry!"

When a foundryman finds out that two molders with a Ridgway Crane can do as much work as three molders with other cranes, you don't have to waste car fare and eloquence on that man. And you—there you go moping around with your heart down in your boots, growling about prices, blaming the hard times—your only approach to joy being a longing look toward the elections next fall, "when the Republicans are going to sweep the country with McKinley, and business is going to boom; prices are going to jump; and you will get 4 cents a pound for your castings like you used to, and any old plug of a foundry will make money and—never, my boy, never. That day has gone and gone for good. Your only salvation is right now and with this wonderful Ridgway Crane. Of course, you don't believe that, but the sooner you find it out the better for your pocket-book.



Steam-Hydraulic Elevator, also made direct acting with cylinder under platform.

"PLEASE TAKE THE ELEVATOR."

People who want a good one do.

CRAIG RIDGWAY & SON, COATESVILLE, PA.

THE APEX
OF
Bicycle Perfection

is represented in the Monarch. All the bicycle goodness that the best bicycle makers know is incorporated in this king of wheels. No chronometer could be made with more care, or with greater accuracy. Every part of the

Monarch

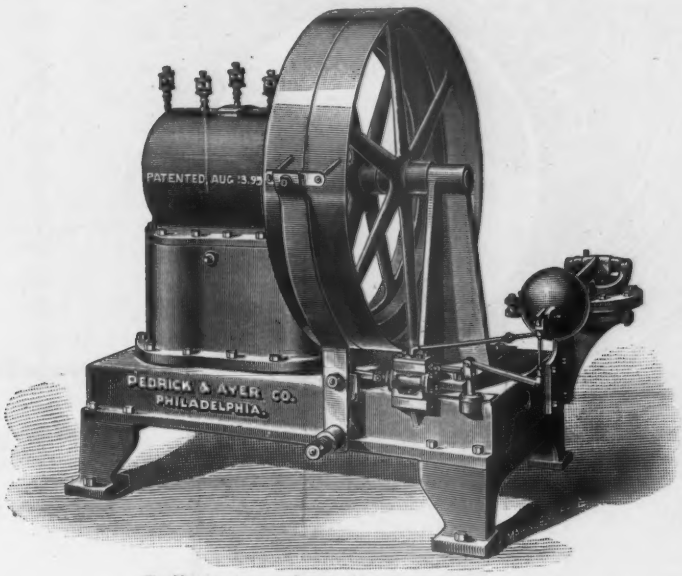
is in perfect harmony with all other parts. So perfect is the distribution of weight, so accurate the adjustment of gear, that the Monarch will outspeed, outlast, outrival, any wheel on the market to-day.

Made in 4 models. **$80** and **$100.** For children and adults who want a lower priced wheel the **Defiance** is made in 8 models, **$40, $50, $60** and **$75.** Send for the Monarch book.

MONARCH CYCLE MFG. CO., Lake, Halsted & Fulton Sts., CHICAGO.
83 Reade St., New York.

Automatic Compound Belt Air Compressors.

PATENTED AUGUST 13TH 1895.



Straight Lift Hoist.

Built in two sizes, Nos. 1 and 2.

No.	Size of Cylinders in inches	Revolutions per Minute.	Cubic Feet of Free Air	Horse Power Required.	Size of Pulleys in inches	Shipping Weight of Compressor	Floor Space in inches	Telegraphic Symbol
1	11x 6 6x 6	100-160	32- 50	2-3½	40x4½	2875 lbs.	60x40	Parian
2	1 x10 8x10	90-120	90-120	5-7	60x6	5370 lbs.	76x60	Parish

AIR HOSE COUPLING

For ½ inch, ¾ inch and 1 inch Hose.

These Compressors will compress more air at less cost than any other make, requiring no atiention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size msde in duplicate. Containing a shut-off valve.

Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.

PEDRICK & AYER CO.

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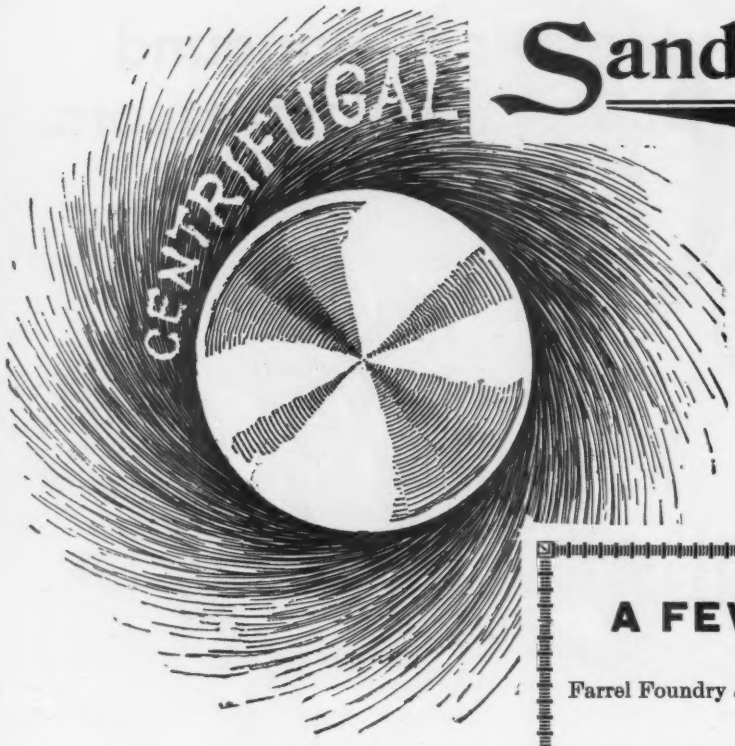

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IT IS

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A new, simple and practical method of **preparing Sand for Molds or Cores,** superseding the old time methods of drying and riddling. Damp Sand is in just the proper condition for working.

The saving in labor alone soon repays the cost of the apparatus.

The Capacity depends entirely upon the facilities for feeding sand into the hopper, this may exceed 10 tons an hour. Two men will easily shovel 5 tons an hour by hand into the machine. One handling is, in ordinary work, all that is requisite.

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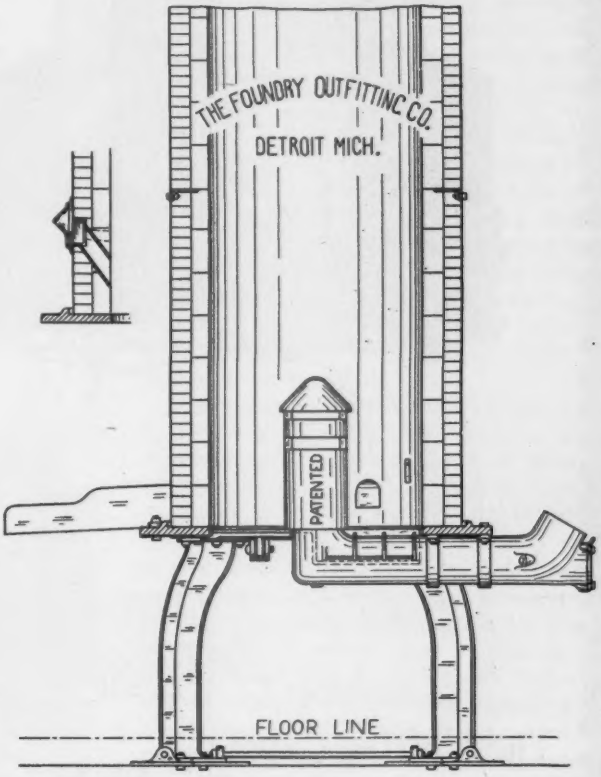
There was a Time

When a few people were rather inclined to make light of the Center Blast Cupola, but that period is now ancient history.

We confidently predict that inside of two years no American Foundryman will think of buying anything else, and those that have, will wish they had taken our advice.



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They will not be able to buy anything else; no other kind will be made. If you are interested in foundry matters, you will watch this. We have made several recent improvements and know that the Crandall Cupola with **Johnson's Center Blast Attachment** will melt More and Hotter Iron, quicker than any of the old style, uses less Fuel and Blast, and is a money saver and money maker from the start.

The Foundry Outfitting Co.

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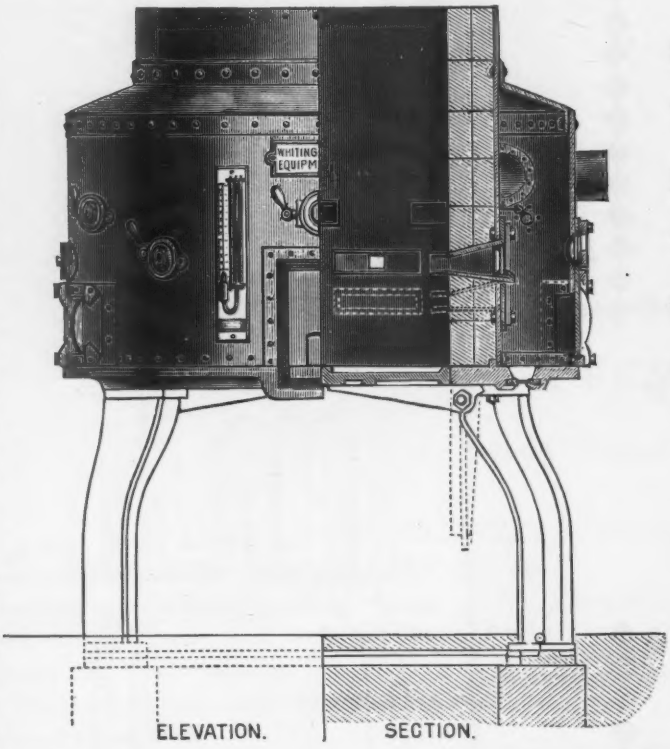

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THE FOUNDRY

VOL. 7. DETROIT, MICH., JULY, 1896. No. 47

The Manufacture of Radiators.

By H. HANSEN.

(CONTINUED FROM MAY, 1896.)

Fig. 3 gives a view of different kinds of chaplets employed and shows their general appearance better than any description would do. The use of tins to prevent the chaplets from entering the core depends largely upon the core sand mixture used. Some foundries with a weak mixture have the tins for the lower side rammed up in the core by the coremaker while others with a strong mixture dispense altogether with them on the bottom side of core. In both cases the molder, after completing his mold,

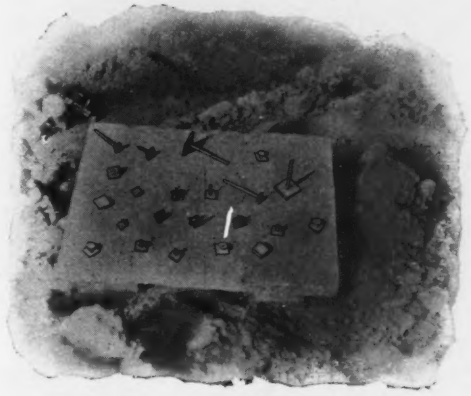

FIGURE 3.

lays a tin on each chaplet spot, which is marked for this purpose by the corebox, though in some places the coremaker saves the molder entirely from this labor by placing whatever tins are needed on the core when making it.

Bars in flasks and the adjustment of chaplets appears to be rather a matter of personal taste, some foundries adopting a bar that nearly touches the chaplet, some even going so far as to plane these bearings to an exact height or inserting set screws in same that permits of a perfect adjustment. The writer has found that under all circumstances it is a bad plan to use short chaplets and to have the bars come close to the pattern, because in the lightning movements called for here, soft spots are liable to occur with a consequent swell upon the casting, as there is no time to go over the same ground twice and correct errors. As for a short chaplet it is very liable to stick down and cause a "rat" by the sand not getting sufficient hold upon it to bring it up if the least friction should exist. With a long chaplet and bars kept, say one-half inch away from pattern, the chances favor tucking, and, as for the chaplets, these may, if two inches long, be neglected altogether, as the sand will, in ramming, be made of sufficient density to prevent a swell.

While having the subject of ramming in mind it will be well enough to offer a small explanation as to how this is done, as some of the readers may be skeptical of a man's ability to ram up sixty of these flasks a day and still retain his health. In reality there is no ramming excepting a small amount of peening done at the start around the edges of the flask. After this the molder a sort of manages to pack the sand together by the aid of his feet, and if ever a man's feet were put to a useful purpose and earned their shoes irrespective of the exertions of the rest of the body, surely the radiator molders are. We have tried repeatedly to take a "snap shot" at these men in the act of passing from one end of the flask to the other, but have been compelled to adjourn our intentions sine die, since their movements proved too lightning-like for our camera. We don't want to be looked upon as prevaricators, but will say that we witnessed a molder and a helper ramming up thirty-six half flasks in an hour and placed them in position on the floor ready to receive the core, so that some idea of the rapidity with which this work can be done may be formed.

A man with large feet will not ram a mold as hard as one with smaller appendages. What are you laughing at? I can hear some of you say: "Here is that Hansen with an-

other of his Scandinavian yarns again." You may smile and believe as you please about me not being able to photograph a radiator molder's movements, but you will hurt my feelings if you think that I am joking when I say that his ability to ram a mold depends largely upon the size of his feet, and that big feet are not in it. I will demonstrate this just to show that I am not always a liar and also to prove that we can use arithmetic in the foundry if we can't algebra. Assuming that a man with a number twelve foot covers with his feet an area of ninety-six square inches and that he weighs 192 pounds, then, when standing still, his weight is exerting a pressure of two pounds per square inch. We will now take a man with a number eight foot and say that his feet cover an area of sixty-four square inches and that he also weighs 192 pounds, then, when standing still, the weight of his body will be exerting a pressure of three pounds per square inch against two for his big-footed brother, and if this difference exists when standing still it will also be present under like conditions when their bodies are moving and exerting the pressure due to falling bodies. The correctness of this theory has been verified from actual practice; it was investigated because the castings from different molders would not be alike in weight, other conditions being equal. We can only say in conclusion, that the molder who can pose his body on the smallest surface like a skirt dancer is the one who can do the hardest ramming—when it comes to doing it with the feet.

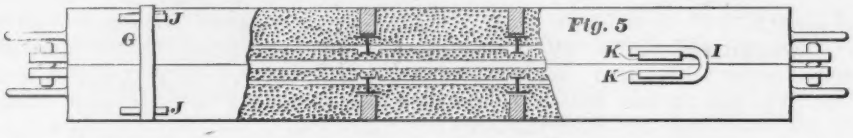

Fig. 5

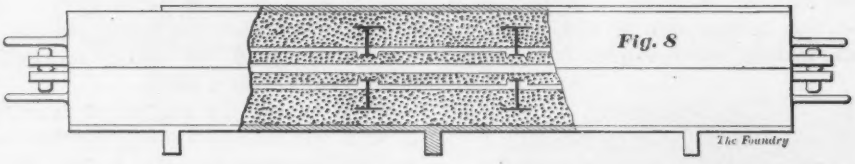

Fig. 8

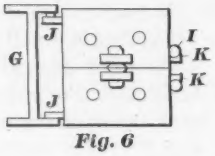

Fig. 6

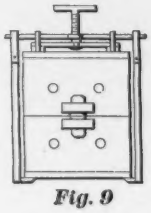
Fig. 9

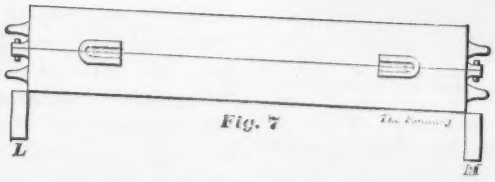

Fig. 7

Fig. 4 (in May issue) shows the plan of flask—cope or drag—both being made alike and capable of being used for either. Fig. 5 presents a view of completed mold with a sectional glance at same, showing core in position. Fig. 6 is an end elevation. In the

last two figures is also shown two ways of clamping, G I, and two kinds of lugs cast on the flask for this purpose, J K. Molding after this style is done without bottom boards and to give the mold the small slant generally adopted to facilitate running the casting two straight edges, L M Fig. 7, are bedded in the floor the whole length and remain so permanently. With a straight edge the molder prepares a level surface between these and rams up a number of drags first and then setting his cores, rams up the copes. This adds an extra impetus to the work, for by doing the same part of the work as much as possible at one time there is a gain over methods requiring continual changing, but part of this gain is to some extent lost again in the greater distance the molds must be carried from the pattern to their place on the floor.

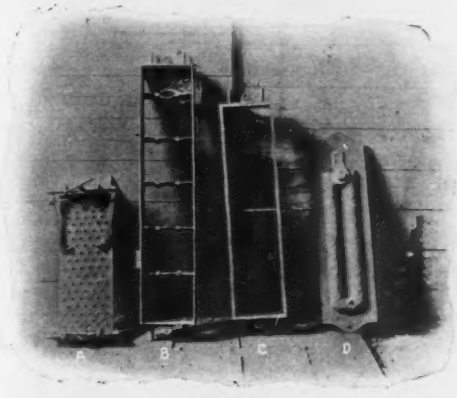

FIGURE 10.

Figs. 8 and 9 represent a later development of radiator making, where the bars of the flasks are entirely dispensed with, permitting the use of a longer chaplet. With these flasks tucking need not be done and there are several other advantages connected with its simpler form, chief among which is the evenness with which ramming can be done, resulting in a finer casting.

A. Fig. 10 is a photographic view of the clamping plate used on these flasks. The whole thing, clamps, plate, screws and all, are fastened together and capable of quick handling. It will be observed that the clamps can swing in any direction and may, with a couple of turns of the screws, be easily adjusted. This clamping plate not only takes the place of a weight, supporting the cope and chaplets, but is one of the greatest aids in producing castings of uniform weight, as the whole mold is by this arrangement held in such a secure manner that it becomes impossible for anything to give away.

Fig. 11 shows the completed mold ready for pouring and will in itself easily answer anything which may be omitted in its description. About this time some of you are beginning to ask the old question—does it pay? Most assuredly it does; it abolishes clamps, wedges, clamping irons, hammers and the eternal nuisance of taking care of all these minor articles of foundrydom; it gives a better and cheaper service, helps to produce a finer grade of castings and leaves nothing to chance work.

B and C Fig. 10 are respectively the old and new flasks. Now in regard to flasks, it is not always the one on which the most

FIGURE 11.

money has been spent that gives the best service, as is proved right here. B is liberally supplied with bars, and as shown each of these has two screws that can be adjusted to exactly fit the chaplet. It makes a better looking picture than its neighbor C, which has only a small rod through center to keep it from springing, but the latter is more useful and far ahead in efficiency. It will last longer, show a cheaper first cost and cost less for repairs than B; it is planed on both sides to form a perfect joint, not only with the bottom plate, but with the clamping plate also.

Speaking of planing joints reminds us that some shops like to get through with this a little too soon. Instead of planing the flask its full length they leave a couple of

places about an inch long on each side for this purpose and let the rest have a clearance. This cheapens the cost of machine work, but should not be considered a progressive idea for that, as these clearances are the most fruitful source of run-outs and when a radiator mold starts to doing this trick it is a corpse. A flask should be planed its whole length to prove of the best service. In this way less sand can be used, and, though it may cost twice as much as the other, yet it will save this cost once in three months as an insurance policy against run-outs.

We came near omitting a small object on which most every foundry has its own patent; we refer to the flask pin. All radiator shops are not alike, either, but the

FIGURE 12.

writer wishes to say that after an exhaustive examination into the mer ts of a large number of flask pins, he has only found one worthy to be marked an A1. We will call it the independent pin, because it is not fastened to either part of the flask. Did you ever notice how straight a piston moves in a cylinder? Well, this pin works on the same principle, the pin acting in the same manner as a piston and the holes bored in the lugs of the flask corresponding to the cylinder. Now we want to caution you against hiring a boy for this job of turning up pins and drilling flasks; get a good man and impress on him the necessity for accurate work and you will be money ahead. Don't say like most foundrymen that if you get within a sixteenth of an inch it is all right; furnish him first-class tools and templet to do this by, and you will have a flask and a pin that will be the most perfect that can be made. This work, when properly executed, makes all flasks interchangeable and you must lift them straight with this pin to get them off, as you can neither tip sideways or endways without binding. These pins usually have a small shoulder turned on them at the center to prevent

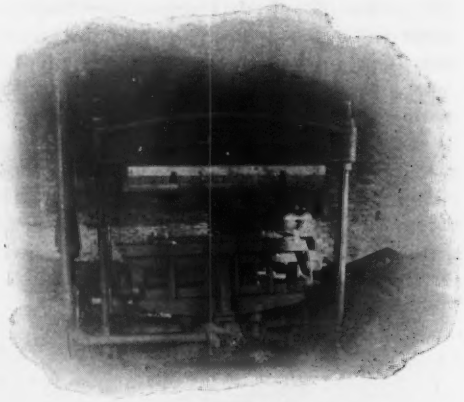

FIGURE 13.

them from slipping through, though in some shops they are made of a uniform diameter throughout and each molder receives only a few to use, as the pins are withdrawn when the flask is closed. In this way a couple of pins may do duty for a

FIGURE 14.

whole floor and last indefinitely, as there is positively no chance to injure them.

Not only do these independent pins recommend themselves for their great exactness, but should any of them become defective they may instantly be changed without causing the annoyance of hunting around for a

man who is willing to lend you a monkey-wrench, and, maybe, the nut has become rusted on and you have got to go across the road to the boiler shop and borrow a pipe-wrench or get the chipper with hammer and chisel to cut it off. With an independent pin, every molder is absolutely his own master, and will do enough more work in a month to pay for them. As they are taken out of the flask, when these are shook out, there is no chance to bend them in handling, and how much of this is done with a stationary pin, no one knows better than the writer of these lines, who has some beautiful scars remaining on hand from attempts to straighten them, and also an unsettled account with the recording angel for a stock of fireproof language used in blowing off his vent.

Most of the lugs we show in the illustrations accompanying this are placed on the end of the flask. According to the best practice this is wrong because in pouring the molder is liable to spill some iron around the pins and cause them to be bent and spoiled as the gate is placed next to the end. With the lugs placed on the side there is nothing of this kind liable to occur.

D Fig. 10 and Fig. 12 show what is termed the matchplate pattern. In this case a complete pattern is required as half a pattern is placed on each side of plate, and with this style each mold is usually completed as it is made. With this the molder has to draw the pattern while with the old style table or half pattern he was saved this work, as both cape and drag were lifted away from the pattern.

Figs. 13 and 14 give two views of a Tabor molding machine arranged for this class of work. It is nip and tuck between hand labor and the molding machine in making radiators, with the chances favoring hand labor. This condition exists not because the machine does not perform its work perfectly—in fact, it makes castings of the most uniform weight and appearance—but because it only does one part of the work, that of ramming; hand labor being employed to put on flask, take it off, set chaplets, riddle sand and filling flask, brushing the pattern each time it is used, and striking the flask off after ramming. Until a machine is designed that will automatically perform some of the above enumerated functions now done by hand, hand labor will, in this class of work, prove a hard competitor for it to handle, as the machine must remain idle the greatest part of the time.

(To be continued.)

Western Foundrymen's Association.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, June 17, 1896, at the Great Northern Hotel, Chicago, Ill. The president, Mr. A. W. McArthur, occupied the chair.

The secretary read the following applications for active membership: James A. Brady, J. W. Reedy Manufacturing Co., Chicago; A. H. Blackburn, Mattawan, N. Y., and E. A. Sumner, American Radiator Co., Detroit, Mich. And for associate membership: C. O. Billow, Chicago, and Charles S. Burt, Chicago.

On motion, duly seconded, the five applicants were elected members of the association.

The secretary read the following paper by Thomas D. West:

Power of Blast Penetration and Improvements in Center Blasts.

There has been much speculation as to the force of blast existing in the center of a cupola. Some have gone so far as to assert that the burning out of a cupola's lining at the melting point was due to the force of blast from the opposite tuyeres. The conviction that blast expends its power most largely at the entrance of a tuyere has been an incentive to the writer to utilize "center blast," and the economical results which he has obtained from its use have demonstrated to him that his convictions on this point are correct. A little experiment which the writer conducted recently will show any one trying it the inability of blast to exert any great power or pressure in the center body of a cupola. This experiment consists in simply getting into the inside of a cupola after the bottom is put up and holding a handkerchief at varying distances from the outside tuyere openings, with the blast or fan running at full speed. In the 66-inch cupola shown in Fig. 40, having six tuyeres 3 inches by 16 inches, holding the handkerchief a foot away from the tuyere opening or inside sur-

face of the cupola, the blast had no perceptible influence on it. This was a revelation to the writer, as he thought before entering the cupola he would be smothered with the effects of rushing air, but was happily disappointed. Of course, the writer does not wish to imply by this that when a cupola is filled with fuel and iron, the blast will not penetrate further toward the center; but nevertheless, it is very far from exerting the same pressure at the center as it does at the entrance. To more fully prove this, it is but necessary to watch a cupola at the close of its heat, when the stock is settled down, say, about half way, so as to enable one to observe more directly the action of the blast. Here a careful observer will readily notice that the action of the blast is to turn upward right at the tuyere's entrance with but a very small percentage of the blast reaching the central body. In fact, the blast at the tuyere entrance creates such excessive combustion at the outer circle, that very hot flames will be seen burning upward right over the tuyeres, playing against the walls or lining of the cupola, with the center body of the cupola comparatively free from live combustion. We may, by reason of greater blast pressure, or a smaller tuyere area at its entrance to the cupola, penetrate the center body of the fuel in a cupola to a much greater extent than can be obtained with the ordinary pressure used. Blast furnace practice demonstrates to us what high pressures can do to force blast to the center, but we find such a practice in cupola work to be very objectionable, simply on the ground that small tuyere area or high pressures of cold blast cause rapid chilling or closing up of the blast passage at the front of tuyeres. For this reason we find high pressures or small tuyere areas, especially where coke is used, impractical or very objectionable in cupola practice, because of the cold blast. If any one will conduct the experiment cited above, of getting into a cupola to test with a handkerchief the extent of blast penetration, the author believes he will be brought to realize more than ever the utility of "center blast" for cupola practice.

Ever since the writer first introduced "center blast" proper in his paper before this association, in October, 1893, he has been continually experimenting to further improve and perfect center blast, with the idea of making it so simple and reliable that all founders would find it to their advantage to adopt such methods.

The objection to center blast, at the time of its introduction by the writer, was due to the difficulty of erecting same and connecting to blast attachments. By a study of this paper, those two objections will be found largely removed. In Fig. 40 is seen an arrangement designed by the writer, whereby the center tuyere is a permanent fixture, not requiring to be dropped with the bottom at the close of a heat, as is necessary with all other designs. This is only practical with cupolas over 50 inches inside diameter. For cupolas below this size, the author has designed the improvement seen in Fig. 37. The advantage of this construction lies in the "drop door" being so designed that it obviates the necessity of putting up and taking down blast pipe connections every "heat." It will be understood that in cupolas below 50 inches it is intended that the center tuyere shall drop with the bottom at the close of a "heat." The writer has not, as yet, used the principle seen in the blast inlet drop door shown in Fig. 37, but from his experience he knows that if the plan shown is followed, it will prove quite a convenience over other methods now being advanced.

As will be seen, the writer advises the use of outside tuyeres in connection with the center tuyere, providing they are made independent of each other in action, by reason of valves or blast gates, as seen in Fig. 37, whereby the blast pressure can be perfectly controlled in the center and outside tuyeres to obtain whatever pressure in either may be thought best.

The blast area of the opening at U, Figs. 37 and 35, is to be found by dividing the area of the cupola by 30. If the cupola is 40 inches inside diameter, this gives an area of 41.89 inches, or, in rough figures, an opening 4 inches by 10 inches, and at I a diameter of about 7 inches. The width of the opening at V for the admittance of the blast to the stock in the cupola should range from 2 1-2 inches to 3 inches, the larger space being best applicable for long heats. It will be noticed that the arrangement of drop door calls for a greater height of bottom sand by two to three inches than is usually adopted in the ordinary cupola. This may be objectionable for some cupolas, but the same

can be overcome by having the drop doors extend lower with a flange around the circumference to project upward to close the bottom plate of the cupola, as suggested at B B, Fig. 36, and cutting a piece out of the bottom plate at B, Fig. 37, and then strengthening the same with a wrought sheet bolted to the bottom plate.

For holding up the drop doors with props, two bars are to be used as represented at E, one to be on each side of the blast inlet circle. H is a door so hinged and held up by means of the weight, wire rope, hook and staple seen at M, P and F, that should any occasion call for its being opened suddenly

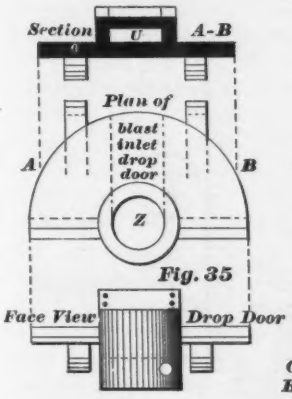

Fig. 35

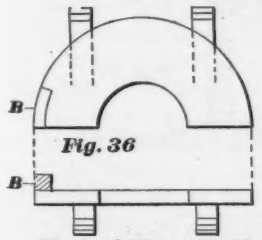

Fig. 36

Plan of Plain Half Drop Door.

Fig. 38

Fig. 39

to release any slag or molten metal that might from any cause, leak down the center tuyere, it can be quickly operated without causing any stoppage or much loss in blast. S is a peep-hole to be closed with isinglass. A is a rib to make a backing for clay to tightly close the joint of the drop door in its union with the wind box K, and which should be of the same area at K for the admittance of blast as that cited for the area at A. D is a recess to admit a slide valve to close the end of the wind box K. N is one of the ear-lugs for hingeing the drop doors. R is the sand bottom showing the cupola ready for its bed of fuel. C, the center tuyere, and X the covering cap. W, branch pipe for the outside tuyeres, and L for the center. The plan and section views of the drop doors seen at Figs. 35 and 36 will explain themselves.

In describing the large cupola, Fig. 40, the cap casting seen at Fig. 38 should not be less than 1 1-4 inch thick in any part, and the greatest attention paid to having the edge at R closely pricked with a double row of 1-4-inch pieces of wrought iron rods or nails, as suggested at K and A B, Fig. 38. The cap X is the only part of the tuyere requiring extra care. This is necessary in order to get it to stand the action of the fusing heat and friction of the steady downward movement of the fuel and iron when the cupola is in blast. Protect the edge R so that the clay cannot be broken away from it, and you can then expect perfect success in utilizing center blast. The prickers C, D and E should extend about two inches high and be as thick as they can be comfortably cast on. X at Fig. 38 is a 1-2-inch hook cast in the cap to handle it by. The recess at J should be about 3 inches deep and of a diameter to admit the cap supporters as seen at Y Y Y, Fig. 39. These supporters are made of 1 1-4-inch wrought iron bolted to the tuyere casting. It is not necessary to protect them by clay, likewise the under side of the cap at E, Fig. 40, as the cold blast keeps these points sufficiently cool to prevent them fusing or even getting very hot.

This cap should be about 4 inches larger in diameter over all than the outside of the center tuyere up at V. The center tuyere upright is made of cast iron. In the plan view at Fig. 39 are seen eight ribs cast so as to run the entire length of the tuyere, over which are placed 1-2-inch wrought iron rings, as seen at M, Fig. 39, and at the numerals 1, 2, 3, 4, 5 and 6, Fig. 40. Owing to the center tuyere being made on a taper, as shown, these rings are readily adjusted to tighten themselves. We find this method better than prickers to hold the clay and to extend the life of a tuyere to run through a large number of "heats." A 1-4-inch wrought iron or boiler plate upright tuyere could be used in place of the cast iron one shown, which is about 3-4-inch thick, and for cupolas where it was intended to drop

them with the bottom, boiler plate center tuyeres would be best on account of their being lighter to handle. These upright tuyeres and covering caps are dried in their positions or in an oven before being subjected to a regular "heat."

It is to be understood that the tuyere shown with the large cupola or Fig. 40 is a permanent structure, not to be dropped with the bottom, thereby overcoming the inconvenience heretofore experienced in being compelled to erect a center tuyere at every "heat."

The recess at N, Fig. 40, is caused by reason of making that part of the diameter sufficiently large to admit of the door dropping without striking the flange through the section O O. A flange will be noticed on the center tuyere at its lower body, projecting over the drop doors. This is needed in case it might, at any time, be found necessary during a heat to move the section M. This section is seen to have one end on an incline as at the flange A and B, and on removal of the pins H H can be readily slid out from under the center tuyere, after the branch blast pipe attached to T is disconnected. In a few moments the section M can be replaced ready again for the passage of blast. At F is shown an opening level with the ground floor, at which point is also seen a door, U, which should extend fully half the way round the column, as shown, and have double doors, so that should any iron or slag for any reason chill inside of the column at its bottom it can be readily removed. The slope D at this door inside the column is formed of sand. If rough castings are used, the points at A B and O O can be bedded in soft clay to make them wind-tight. Of course these joints could be planed to save this labor, if desired.

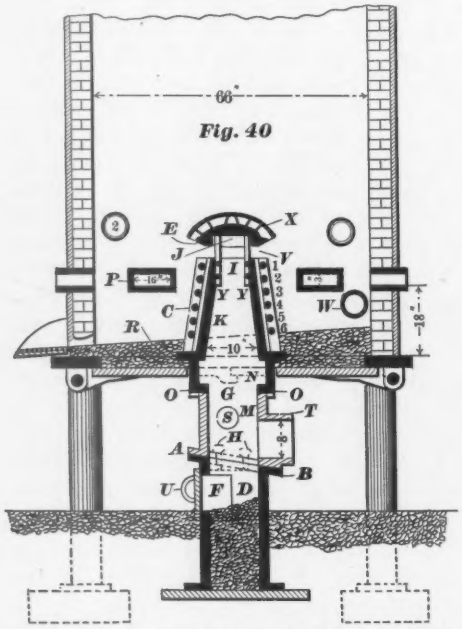

Fig. 40

West's Permanent Standing Center Blast for Large Cupolas.

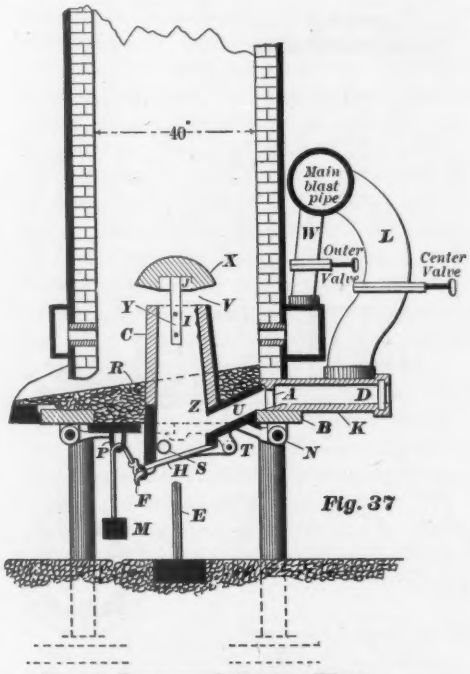

Fig. 37

West's Improved Center Blast for Small Cupolas.

The writer has not shown any outside blast connection or branch pipes to lead to the center tuyere projection T, Fig. 40, for the reason that there are but very few cupolas alike in their wind box and blast connections.

When first starting to use center blast, the author thought he would have difficulty in obtaining a lining for the tuyere and covering cap that would withstand the fusing heat of the cupola. Experience has proved that any fair grade of fire clay will answer,

and while it is advisable to have an extra dried tuyere and covering cap on hand, many will be surprised to learn that where center tuyeres are not dropped with the bottom, they will run for a dozen or two "heats."

The center tuyere cupola excels any other form in the saving of fuel, lining and time in melting. It also excels by reducing the wastage of iron through chillings being contaminated with the cloggings around the tuyeres and refuse of a "bottom drop." This is owing to the excess of heat at the end of a "cast." As a general thing, the longer the heat, the greater the fluidity of the metal obtained. With this center blast no fumes or gas are to be seen shooting up out of the stack at the close of a "heat."

Every now and then we hear of somebody resurrecting old designs, thinking they have something new. The author has now special reference to the plan being advocated of drawing in a cupola above the tuyeres, making its area at the bosh thus formed about a third less than any other part of the cupola, thinking by this to attain the end gained by center blast. The bunging up due to such designs, where heats are extended to any length, long since has relegated this old design to obscurity. The writer has tried all these methods to learn just how far they could be utilized in an effort to approach center blast, but has found them of little value.

The arrangement of the designs for center blast herein described admits of a cupola being run to finish its "heat" should anything go wrong with the center tuyere. The removal of the section M, Fig. 40, or the opening of the drop door H, Fig. 37, admits of the center tuyere proper being plugged up with stiff clay so as to shut its blast off and permits a continuation of a heat by the use of

The arrangement shown in Fig. 40 has been used in the writer's foundry for the past four months with the greatest success, not only in "heats" of an hour or two, but also in "heats" of four or five hours, since we seldom melt less than 40 or 50 tons at a "heat," in the large cupola shown. It will thus be seen the center tuyere has been subjected to a very rigid test.

Briefly stated, the advantages which we find in favor of "center blast," in comparison with other methods are: 1, Reduction of fuel from one to eight to one to twelve; 2, less wear on the lining; 3, increased speed of melting; 4, less wastage of chilled iron and shot; 5, less absorption of sulphur by the iron; 6, absence of flame escaping from the stack. The iron we melt is mostly all pig, only shop scrap being mixed in with it, and the mixture we use must not exceed .10 in phosphorus, which calls for a greater percentage in fuel than if the phosphorus was higher, owing to the greater fluidity which an increase of phosphorus can add to the metal. In charging the cupola seen at Fig. 40, we place 1,430 pounds of coke for the bed and 390 pounds between each charge of iron. On the bed we have four tons of iron and three tons between every charge of coke.

For a "heat" of 40 tons, which is as small as should be run in such a large cupola, the amount of fuel used leaves us melting 1 to 13.09. For 50 tons, 1 to 13.49. For 60 tons, 1 to 13.93. For 70 tons, which is the largest heat, we have run 1 to 13.97, and, as said before, the iron is hotter at the end than at the beginning of the "heat," and it has sufficient fluidity to run stove plate, if not detained too long in the ladle.

The writer wishes to call attention to the fact that in figuring up the ratios of fuel to iron used as ranging from one to eleven and from one to twelve, no account has been taken of the coke saved from the "bottom drop," which ranges from 300 to 400 pounds at a "heat. Did we take note of this, it would safely increase our melting ratio to read one to thirteen, up to one to fourteen.

The more center blast is used intelligently the faster will it supersede all other forms of melting. Different conditions call for different designs, as the plan which proves a success for one cupola or class of work may be an utter failure for another. Each founder should judge for himself as to the best methods to be adopted in his work.

The secretary then read a letter from Mr. West, which had been received after the paper.

Discussion.

Mr. W. N. Moore: I have had no experience in center blast cupolas. I do not know how much I might have had if I had not found some other people were putting them on the market and waited to see what the result would be. That is about all the information I possess, and I guess everybody has that.

The Foundry Outfitting Co. has a center blast cupola on the market and we were disposed to try it.

Mr. West's letter of explanation as to the way in which he came to make an error in getting his coke consumption seems to me to rather weaken his assertion of the remarkable results he obtained. Without being in a position to criticise or say that Mr. West does not get these results—because we have to take his statement as it stands—it is evident that he is depending upon "forkfulls" of coke. Mr. West corrects his result and says that 13 to 1 is too low. I think there is only one way to determine the amount of coke consumed in the cupola and that is to weigh every pound of coke as it goes up on the scaffold. I think the weight of Mr. West's argument would be very much greater if he were able to state that the record of the coke had been accurately kept. I think his paper would be stronger if his letter of explanation had not been made. However, the subject is a very interesting one, and whether Mr. West is consuming 12 to 1 or 10 to 1 he is evidently satisfied that he is getting very much better results. I think it is a subject that will bear investigation. Several of his propositions seem to be reasonable.

Mr. A. W. McArthur: It is very much to be regretted that Mr. West does not give a great many of his facts in much more exact shape.

In his little experiment of going into the cupola with a handkerchief there is not enough definiteness about it to make it at all valuable to me personally and I do not see how it can be to anybody. I think that if he had held his handkerchief a foot away from the tuyere opening he would have found a very decided current of air.

Mr. Wm. Ferguson: I had never any experience, either experimentally or practically, with center blast tuyeres. I have thought for some time that it was the proper thing to do with a cupola. I am much pleased with Mr. West's paper and explanation of the work he has put upon the thing. As to the results that he is getting, I think that they are a little visionary. I am skeptical of those results on account of experience I have had with other patented cupolas that have claimed economy, and, up to date, I have not found any of them more economical than other cupolas. The objection I have always found to a center blast was taking care of it. The amount of labor there would be in taking care of it would overbalance any benefit that might be derived from its use. The only way to get at this thing is to go at it and see what can be done. He states the thing very clearly and probably if foundrymen would take hold of it they could help him perfect it.

Mr. Pettigrew: I have never had any experience with center blasts. I think if any foundryman will go into an empty cupola he will find the experience of Mr. West just as he states it. But let him put a charge on—say enough to make a bed for the heat—and then go in and try his handkerchief experiment and see what it will do. I think he will find that the diffusion of the blast through the cupola is pretty even. It will diffuse itself through the fuel in pretty uniform ratio. The slag and iron will stay right around the tuyeres, caused by the chilling of the blast, then we have got to have a center blast to melt the iron, and you will find after a large heat, that if about twenty-five per cent of the heat drop clean on account of the excess of heat being in the center. My idea has always been to have a hot blast for the cupola. My ideas have always run more to having an arrangement of tuyeres something like a blast furnace. By this arrangement you will find, with the warm blast up to 300 degrees or 400 degrees, there will be a great saving in foundry practice.

Mr. Moore: I am right in line with Mr. Pettigrew in regard to what he says about heating the blast. I would like to ask the secretary, who, I believe, figures on these things once in a while, whether there are any figures to show the amount of heat units or coke that is used in heating the air from its normal temperature up to say 500 degrees, or to a point that possibly can be gained by the use of reheating appliances which are used to heat blast furnaces.

Mr. A. Sorge, Jr.: I have made such estimates, Mr. Moore, but, unfortunately, I have not them with me. I cannot give the figures. It is not a very difficult thing to determine. I went into that subject not very long ago in looking over a foundry and I found that if about twenty-five per cent of the heat which usually escapes from the top of the cupola—that is that heat which is produced by combustion—were used for heating the blast that the temperature of the air could be raised up to the vicinity of 450 degrees—that is,

assuming the melting capacity of the cupola to be 8 of iron to 1 of coke. By means of this heating of the air the melting capacity would be at the ratio of about 1 to 14.

Mr. Moore: The theoretical consumption of fuel to iron would be about what?

Mr. Sorge: About 1 to 32, and the actual is about 1 to 8—that is on the average daily run. By saving twenty-five per cent of the heat that usually goes out of the stack, and this can be done without any difficulty, I think, will bring the ratio from 1 to 8 up to 1 to 14.

Mr. Ferguson: How do you account for that rapid increase in the ratio when you only estimated one-quarter of the heat as wasted?

Mr. Sorge: I account for it in that three-quarters of the total heat is wasted originally.

Mr. Ferguson: How can you increase that 1 to 8 to 1 to 14?

Mr. Sorge: You are losing at least 75 to 80 per cent at present in the stack. If you could save about 25 per cent of what you are losing in the stack, which I think can be done very readily, you can raise it to 1 to 14. In heating up to a temperature of this kind, say 400 or 500 degrees, no special cooling apparatus is needed. In a blast furnace they run the heat up to 1,100 degrees or 1,400 degrees, but in a cupola I would not use more than 450 degrees or 500 degrees.

Mr. Carver: I note that Mr. Sorge states that he considers it a very good foundry practice in cupola melting to obtain a melt of 8 pounds of iron to 1 of coke. It seems to me that the ordinary owners of foundries would consider it very poor practice if their foreman or superintendent did not obtain better results. I do not understand how Mr. Sorge makes out as extremely good foundry practice to melt eight pounds of iron to 1 of coke.

Mr. Sorge: I did not say it was extremely good foundry practice. I said it was ordinarily good foundry practice. I think that if you will go through the foundries in the country and get their actual weights of iron and coke you will find that it is good foundry practice. I have melted 12 to 1 and I can do it again, but I have yet to find the practice the year around with a correct record—actually weighing every pound of coke going on the platform and every pound of iron going on the platform, to exceed 1 to 8. That is my position in the matter.

Mr. Thompson: I do not think the paper has gone far enough to give us any idea whether this is economical melting or not. While Mr. West claims to show a saving of fuel it would have been better if he had shown the cost of repairs.

Mr. Carver: Has anybody brought up the question as to whether, in actual practice, the blast around the outside of the heat, would not tend to bring the temperature of the central part of the heat higher than if the blast were confined to the center and expected to radiate heat to the outer edges of the cupola? Now, for instance, you can take an ordinary coal fire in a stove. You have no difficulty in the burning of the fuel in the central part of the fire. If there is any dead coal anywhere it is usually around the outer edges of the stove and the lining. I bring this question up to know whether or not the present diffusion of air through the tuyeres from the outside does not give better results on account of the better distribution of the air than if confined to a central location.

Mr. McArthur: Mr. West's whole contention is that with tuyeres on the outside of the cupola, the blast does not penetrate to the center of the charge.

Mr. Pettigrew: I do not hold to that opinion at all. I think the first remark I made would show that the center is always the hottest part of the cupola. Any one that has noticed a cupola dropped will always see—it does not matter how much chilled iron there may be on the outside—that the center will always drop clean, evidently showing that the hottest part is right in the center of the cupola. That is the point I tried to make. I am sure it will hold good in any cupola. Mr. West places his blast both outside and in the center.

Mr. Moore: I made an experiment some years ago. The idea was the outside of the cupola was cooler than the center, as shown by the bridging of the outside, therefore the iron should be in the center. Working on that idea I went up on the charging-floor one day, and, much against the advice of the wiseacres, I worked the charge, having the iron pretty much in the center and the fuel pretty much on the outside. I presume there are others that have worked on this and have had the same result. If there are those that have not, I would not advise them to do it. If there was not a strong tendency in the ordinary cupola to drive the heat from the outside

toward the center an experiment such as I tried would not have been a failure.

Mr. Gibbs: My experience in charging iron in the cupola is to make the fuel and iron as even as possible. Put on your coke even and your iron in the same way. I have always found it to melt better in that way. As far as 8 to 1 is concerned, I think that is pretty good cupola practice.

Mr. O. T. Stantial: I should like to ask some questions in regard to the utilization of the heat in the top of the cupola. I would like to know if any of the members have made any experiments in that line. I have in mind one experiment that was made. A foundryman made up his mind that the waste heat could be utilized and he put his boiler on the top of his cupola, but it was a rank failure.

Mr. Moore: The utilization of waste heat in the cupola is one that the Bessemer steel men are in a position to solve and their interest in the matter is greater than any one else's. They have cupolas that work day in and day out for a week at a time, and yet for some reason, although they spend thousands of dollars—I think the ratio is $3,000 expenditure for the saving of one cent a ton on product—they have not investigated it. Whether it is one of the things they have overlooked, or whether any one has gone into the subject thoroughly enough to demonstrate that it is impracticable, I do not know. I have asked some of the engineers in connection with steel works why they did not abandon their several cupolas and put in a miniature blast furnace and run it, but I have not got a satisfactory answer. The thing has never been done. There seems to be a difference of opinion as to the practicability. Some have told me that the lining could not stand and others have not given any good reason. There is the place where the circumstances are favorable and I think we must look to the steel people to bring out the utilization of the waste heat.

Mr. Stantial: In cupolas of the present day it is generally the custom to make the tuyeres so that the entrance from the blast-pipe is reduced and the tuyeres passing through the lining are broadened out so that the area of the tuyeres where the air passes into the cupola is something like twice the area of the tuyeres where the air enters it. I would like to know why there is any advantage in this or why it should not be the other way.

Mr. Vrooman: The air when it strikes the tuyeres will spread out. If they were pointed it would not.

Mr. Pettigrew: I know of a cupola that had a direct pipe 12 inches in diameter right into the cupola and they did good melting. One tuyere without any blast box at all.

Mr. Sorge: If you would introduce a very intense blast at one point you would produce a very high temperature at that point and burn out your fuel and burn holes right through. I believe the idea is that of diffusing the blast and reducing its intensity at the point where it comes in contact with the fuel.

Mr. Ferguson: I am aware that that point is claimed by the designers of cupolas, but in my own practice I have not found it so. I can recall a furnace of 36 inch diameter that ran with its 4 or 5 inch iron tuyeres direct, each one leading to the center of the furnace, and for speedy melting I have not seen anything yet that surpassed it. As for the lining of the furnace I can state that I was in the shop for three years and that furnace was not relined at the melting point or any other portion. I was told that it had not been relined for four years previous to my going there.

Mr. Dalton: I have a furnace that is very similar to that and it is very easy on the lining. We have not lined it for two years and it is just in shape to be relined now.

Mr. Moore: I think, in speaking of the duration of the lining of a cupola, the amount of brick used for patching should be taken in consideration. We ran a cupola for about a year and it got where it ought to be relined. It was not convenient to do it, and we ran it pretty near another year and did not reline it, but I rather think that if we had relined it when it needed relining we would have saved in brick quite enough to make us come out even. It is sometimes the case when the cupola is run for a long time without a relining that as much brick is used for patching as would have been for relining, if not more. I have a record of a long running cupola, but I do not know how many brick were used to keep it in order, but I know there were a great many.

It was then decided to ask the editing committee to put this matter of center blast cupola on the list of topical questions to be discussed in its order. It was then decided to take up topical question No. 6 for discussion. It reads as follows:

(6). In your experience, what is the most efficient method of cleaning light castings?

Mr. Sorge: I would like to state for the information of the association that I am anticipating getting a paper on sand-blast from Ward & Nash, and I am also trying to get another from F. A. Goodrich & Co., of Detroit. It seems to me the sand-blast will be taken up most satisfactorily by these gentlemen who make a specialty of it.

It was then decided to take up topical question No. 7 as follows:

(7). What is the proper temperature at which to bake cores? What method do you use for determining this temperature?

Mr. Stantial: On our small cores we use steam and it takes a great deal longer to dry them than it does with the fire oven, but we can give them time. We are making them continuously during the day and have relays of ovens.

Mr. Lukens: Our ovens are constructed with shelves. I put the thermometer in and left it five minutes. A two-inch core was dried in one and one-half minutes and the temperature went up to 275 degrees. When it was cooled it was fit to use in the mold.

Mr. Pettigrew: Since joining the Western Foundrymen's Association I have gone around among the foundries more than I have before, especially in Chicago. In visiting The Sargent Co.'s works I found that to be the only place where oil was introduced in the core ovens, or ovens of any kind. I would advise all of the members of the Association to visit those works. It is a clean heat and a good deal cheaper in the drying of both cores and molds.

Mr. McArthur: Did you see any device that would indicate the temperature of the ovens?

Mr. Pettigrew: No. They can tell after a certain amount of experience.

In Pittsburg last year I noticed that the foundries all use natural gas, but they use it through a bed of small coke. They put a bed of coke on the fire and introduced the gas below that. It is clean and quick.

Mr. McArthur: Is this oil flame in the oven at The Sargent Co.'s works?

Mr. Pettigrew: Right in the oven without any bridge wall.

Mr. Sorge: How many burners have they?

Mr. Pettigrew: Two in each oven.

Mr. McArthur: It seems to me that the matter of core ovens is too large a subject to be dismissed. I think it worthy of the special investigation of a committee to report two or three meetings hence after collecting all the possible information.

On motion, duly passed, the president was authorized to appoint a committee of three members to investigate the matter and make a report at the next meeting as to the best method of heating core ovens, the regulating of them and the proper temperature at which to bake the cores.

The meeting then adjourned.

Cast Iron Grafting.

BY W. L. HAYDEN.

In this subject we have something on which lots of thought has been expended. In few instances have the practical results been worth the trouble. The writer does not wish to appear in the role of a discoverer in this article, but merely to relate in

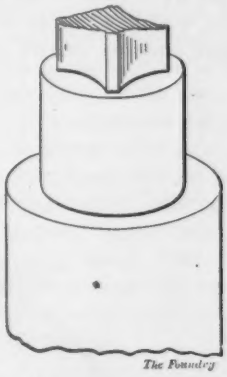

FIG. 1—SHOWING IRON WOBBLER.

plain English the process followed by him in obtaining practical and durable results even when subject to the severest tersional strains. The experiment was carried out in affixing, by the grafting process, the wabblers on three 8-inch train roll spindles. Everyone familiar with the hard wearing strain that these parts are subject to, will be interested in knowing that grafting can be done so as to insure practical results. In the first place we drill and break off the part which may be left of wabbler (shown in Fig. 1), so that it is almost flush with journal bearing (shown in Fig. 2). The fragment of wabbler thus having been removed, we

chip same off in a thorough manner so as to remove all rust, where melted iron comes in contact. A pit is then dug in the ground

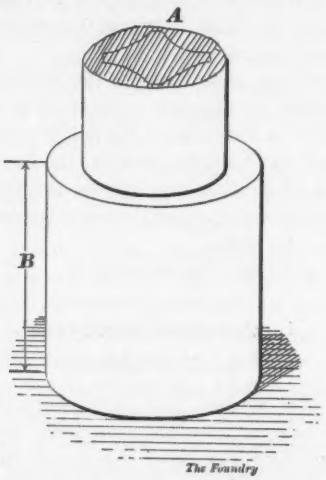

FIG. 2—SHOWING WOBBLER CUT OFF AND PORTION OF ROLL IN PIT.

of such depth as to receive one-third of roller and rammed with sand so as to keep it in a perpendicular position (shown by B, Fig. 2). and journal bearing we are able to make a perfect dry sand mould (shown by Fig. 3). This, I might state, should be produced similar to any dry sand core. The outside diameter of mould should be the same as roll, so that it stands flush up and down. We then place same over journal bearing putting

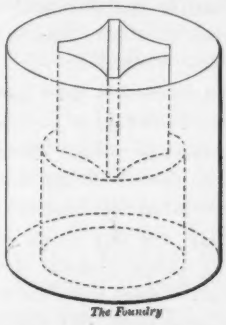

FIG. 3—SHOWING DRY SAND MOLD.

paste and sand where it forms its bearing on shoulder of roll (shown by Fig. 4). The dry sand mould should have a tap hole (E) even with surface of journal bearing, where the grafting takes place, so that the iron fed from above (F) can escape after flowing

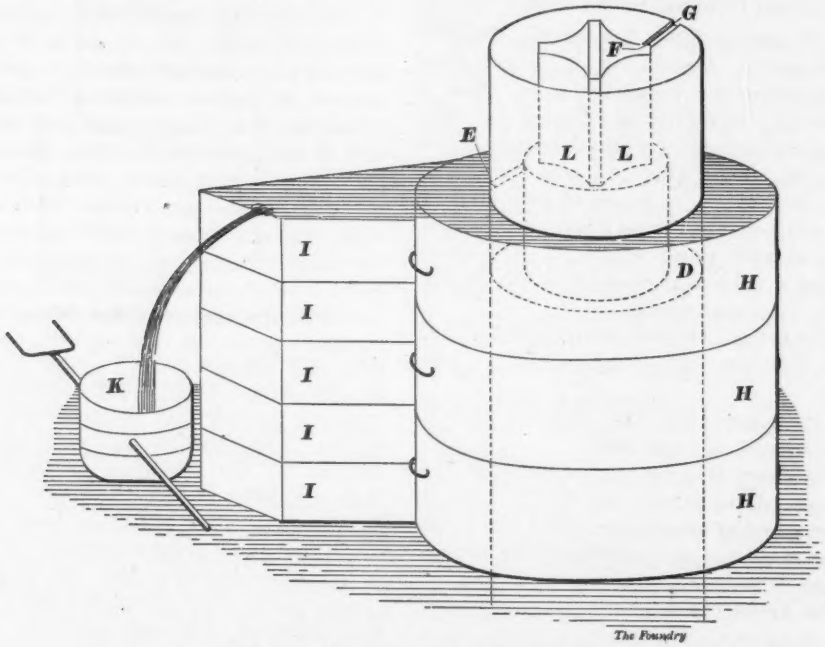

FIG. 4—SHOWING MOLD COMPLETE.

It is best to place a level on journal bearing to obviate an uneven pressure when iron is poured. Having made a pattern of wabbler over iron surface at bottom. At the top a runner (G) notched through mould is cut to let the overflow escape in one direction, into

a receiving bed below, after tap hole (E) is plugged. We next take three parts of a round iron flask (H H H) large enough in size to allow about a three inch clearance and slide them down over mould and roll until it stands about three inches above where mould and roll join (D). The clearance then is filled with sand and rammed, so as to strengthen the mould on shoulder. We then build up with iron flasks weights (1) or anything suitable until even or almost so with tap hole (E). Covering the top plate with green sand and forming a runway for bottom waste to feed into ladle (K) placed below, to be carried away and used in some mould that the deadness caused by process does not harm. This saves any waste of iron. Now that things are placed properly to receive iron, we can proceed, as follows: About three to four bull ladles of cold blast iron are poured respectively into top of mould (F), tapped direct into ladle from cupola, so as to obtain iron of the highest possible heat.

This iron passes completely over surface (L) below and should be continued until the cold iron is melted to about three inches in depth. This can be easily determined by sounding with a small iron rod and subtracting the difference in depth from top of mould, at the beginning, from the increased depths as process continues. The amount of iron to be used cannot always be determined, as the success is due entirely to bringing the cold iron to a heat of 3477 degrees, Fh., or over, thereby insuring a perfect and homogeneous combination of old and new iron. These rolls were not rapped out for one day after pouring, so as to allow the iron to anneal somewhat. They were put a week afterwards in their respective places in our rolling mill and 200 tons of quarter inch steel rods were rolled from one and three-eighths billets, without a mishap. When taken out there was no impression whatever from the severe test and it was noticed particularly that the coupling boxes showed marked signs of the severe work undergone. "Therefore the proof of the pudding is the tasting thereof."

I could not be without it.

H. R. SHIEK,
St. Paul, Minn.

Largest Casting Made in Mexico.

The Compania Industrial's order No. 5,328 is the largest casting ever made in the republic of Mexico. It is a cylinder five feet in diameter, 11-foot stroke, and weighs 16,000 pounds. The casting came from the Foundry without a flaw, and could not have been made better by any Foundry in the United States. The company has turned out heavier work, but none before as complicated and requiring as skilled workmanship. Geo. R. Lunt and Wm. Farrant are superintending the boring. This is the only shop in the republic that has the capacity for running out this work. The cylinder is being made for Compania Minera de San Rafael, at Zacatecas, and is a duplicate of one made in England 40 years ago for this company. The Compania Industrial made a contract with the Compania Restauradora de Guanacevi last February amounting to $250,000. The Compania Industrial is owned entirely by Mexican citizens. They commenced with a small plant eight years ago, but have kept branching out, investing about $100,000 each year; last year they invested $150,000 and have now the largest plant of the kind in Mexico. They employ 350 men, 90 per cent of which are Mexicans; they encourage Mexican labor. Although they have not had the advantages and opportunities presented the American people, they make good machinists. The company is now talking of putting in a steel-casting plant, which bids fair to be a large and prosperous enterprise, one that Chihuahua may well be proud of.—Chihuahua Enterprise.

Among the Foundries.

The Eagle Foundry at Salt Lake City has gone into the hands of a receiver.

The Maywood (Ill.) Foundry, established by the late J. W. Rockafellow, is at present leased and being managed by Messrs. McLeod & Campbell.

The Great Western Foundry at Leavenworth, Ks., is patting itself on the back because they recently succeeded in casting a large sheave wheel weighing upwards of 6,000 pounds.

It is said that the largest bronze casting made in the United States is the buffalo head at the eastern entrance to the Union Pacific bridge between Omaha and Council Bluffs.

A TECHNICAL JOURNAL DEVOTED TO FOUNDRY INTERESTS.

THE FOUNDRY

Published Monthly by

"The Foundry Publishing Co."

DETROIT, MICH.

JOHN A. PENTON,

EDITOR AND PROPRIETOR.

DETROIT, JULY, 1896.

Entered at the Post Office at Detroit, Mich., as second-class matter.

SUBSCRIPTION—One Dollar per year in advance in all parts of the United States and Canada; one dollar and fifty cents per year to all parts of the Universal Postal Union. May be sent by express, draft, money order, registered letter or U. S. postage stamps. Single copies, 15c.

CLUB RATES—Eight or more subscriptions sent at one time, 75 cents per year each. Cash to accompany order.

Advertising rates furnished upon application

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THE FOUNDRY is issued promptly on the 20th. of each month, and will spare no endeavor to furnish valuable news and information to those interested professionally or incidentally in molding, melting, mixing of metals, foundry management, etc. Persons connected with any of these lines of industry will confer a favor upon the Editor of this Journal by sending him news from their section of the country pertaining to the foundry interests, particularly individual theories and experiences of practical value.

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Trade Outlook.

Business on the whole the country over seems a trifle better than last month. No use trying to imagine reasons for every fluctuation in the commercial tide. It gets better and worse, and then better again, and the man who tries to ascribe the correct cause to every successive change would not have time to do anything else.

In the South especially there has been the most marked improvement. This is about the time of the year when the sugar mills make any repairs or enlargements necessary, followed by the cotton mills a little later on, and a large number of Southern foundries are beginning to already feel its effect.

We think that trade is perhaps a trifle better just now in the East than in the West, and hope that "politics," the greatest disturbing element we have, may not interfere too seriously before the summer is over.

Any little boom now in one line would, most likely, effect many others, and any improvement in business will be quickly responded to by pig iron manufacturers, and a raise in prices is sure to follow.

The Scrap Heap.

Well, the country is doomed again. Beats everything just how often these United States of America can be wrecked by the politicians and still live.

It is getting worse, too. In this everlasting greed to get the offices each faction, party or combination of unselfish patriots continue to denounce the particular dogma, or belief of all others not in their particular clique as certain to produce a commercial plague more disastrous to the business interests than the Asiatic cholera could ever be to a nation's health.

Somebody is continually getting elected though and we are still doing business despite the croakers, whether they be Republican, Democratic, Populistic, Prohibitionists, Protectionists, Free Traders, Free Silverites, Greenbackers or Gold Standard men.

As a matter of fact is it not a wonder that business and trade are as good as they are? What greater proof could be exacted of the solidity and stability of this country's prosperity than the fact that we do so well in the

face of the continual bickerings, squabblings and threatenings to be read every day in our newspapers, in which the national credit is sure to be assailed if a certain man is elected or will be ruined if some other man or some other platform (?) is not endorsed.

Such a thing would be impossible in any other country and time alone will tell if it is a good thing for us.

There are some people who think the law of compensation is coming to our assistance in this matter in a way but little expected.

We have been so constantly assailed on all sides with dire predictions of the future for some years back, that these threatenings are having but little effect save in the minds of the superstitious or some few always ready to see the dismal side or to lay the blame for business depression to national causes.

An evidence of this is seen in the action of a national convention recently held in Chicago, when, by a large majority those present favored a policy that would radically change our present financial system and could not fail to have an important bearing upon the nation's future.

Not only that, but a candidate was nominated for the position of President of the United States, who might possibly be elected and who was pledged to carry out the aforementioned views. Did all this bring on a panic or produce any visible disturbance that might be taken as a forerunner of what might happen if such a policy was adopted and the predictions of its opponents were to be verified?

Not a bit of it. A black frost in Dakota or the passing of a dividend by a large railroad corporation would really create more apparent evidences of the sensibility of the money market to what are mere trifles in comparison to the one referred to.

This must be partly ascribed to the prevailing opinion that there is no great probability of such a radical change being inaugurated, but it can also be put down as a certainty that the great American nation is not as "scary" as it used to be. In fact, it is getting "used to it," and beginning to feel more confidence in itself.

A very large and well-known pig iron concern that mails a weekly market review to many of its customers, giving the impressions gathered by its representatives in seven or eight large cities, has this to say, among other things, as part of the New York report:

"Men on both sides of the question prefer that it be a straight fight, and to a finish. That sound money will prevail, there can be little doubt. But if the worst happens, the belief of careful observers is that the effects have already been very fully discounted, in the manner that has become habitual in American speculation and trading. The timid, on both sides of the ocean, have for months been liquidating and making preparations as if free silver were assured. If the inflationists, therefore, should by any possibility carry the country, it is not believed any violent adjustment will be necessary."

If everybody would take equally as cheerful a view of the case, attend strictly to business, discourage pessimism and do their share to promote universal confidence, it would be of greater benefit to us just now than all the legislation possible.

Krank's Korner.

Have men got a right to kick? This question was asked us lately and we unhesitatingly say: Yes. At all times, in all places where a reason exists or is presumed to be present it is one's privilege and actually one's duty to register an emphatic objection. Every progressive man is a kicker, never satisfied and belongs to that class who produce improvements and furnish the world with new avenues of enjoyment and usefulness.

A kicker is always a lazy man, some of you will reply. If he is thank the guiding forces of nature for providing him. One kicker does more toward material advancement than a hundred men who follow and die in the footsteps of their predecessors, confident that they are reaping the full benefit of their existence and satisfied to leave the world as they found it. If a kicker is lazy because he objects to performing unnecessary labor in providing a piece of work, then we ought to be proud of his laziness, for it is on this very thing, on man's inclination to overcome lost motion and avoid unproductive toil that rests the largest pillar of inventive genius and industrial activity.

We entered the employ of a prominent firm of engine builders a few years ago, and the

second day of our stay the desire to kick manifested itself when we were told to make a dozen castings from a pattern requiring considerable parting to be done, without being furnished a follow board. Approaching the foreman we made a plea with facts and figures enough to have moved a statue to give us a follow board, but his answer was: I ain't going to start making follow boards, because if I make them for one job I will have to make them for another one and it makes so much to keep track of. We continued kicking, and the old man sought to soothe us by exclaiming: "Young man, what in thunder are you kicking for? If I gave you a follow board you would make six a day instead of three. I am perfectly satisfied with the amount of work you are turning out, and if you did turn out twice as much you would get no more for it. Where have you got any kick coming when you are getting your day's pay for making castings?"

We have always held to the opinion that the workman who could produce the greatest output with the least expenditure of material and time should be classed amongst the cheapest men a firm could employ, but here was a case where things were good enough. Here was a firm, alluded to as being modern at that, who were willing to leave well enough alone, and although the work could have been done in half the time with proper facilities, yet they were seemingly getting more than their share of the coin. We quit kicking for two months, drew pay for making partings and then we got work up in a way that made us sorry we had not kept on kicking.

One day a typewritten notice was posted in the shop, saying that owing to keen competition, etc., a reduction of ten per cent would be made in the wages of all employes. Then we did kick and so did others who had been satisfied for twenty years. If the firm was justified in making this reduction, and we will take it for granted that they were compelled to for reasons stated, were we not equally, and more so, justified in making a kick when the output of the shop could easily have been increased twenty-five per cent, and thus have avoided inflicting the punishment of a reduction, bringing in its trial dissatisfaction, carelessness and incompetency?

An increase in output is always preferable to employer and employe alike against a reduction of wages. The most productive labor is the cheapest and he who does not strive to this end is digging a hole in the form of smaller pay for himself to fall into.

Live men kick and are worth more for doing so, as they in this manner are continually placing before you needs for further improvements, that would otherwise remain beyond your knowledge and conception.

Some of the Officers of the American Foundrymen's Association.

As the success of any enterprise is often dependent upon the ability with which it is managed, and the character of those who may be for the time being in charge of it, THE FOUNDRY feels that in some respects the American Foundrymen's Association is greatly to be congratulated upon the selections made of its officers.

In order that the foundry trade may become better acquainted, if possible, with

FRANCIS SCHUMANN.
PRESIDENT AMERICAN FOUNDRYMENS' ASSOCIATION.

those gentlemen, we hope to be able to introduce the most of them to our readers through these columns.

Mr. Francis Schumann, so well and favorably known as the president, even since its formation, of the Philadelphia Association, and who is also president of the American Foundrymen's Association, is undoubtedly, from his experience and knowledge of the business, the best equipped man in America

for that position, and the very fact of his having been re-elected is of itself a tower of strength, and confers a degree of dignity and importance to their gatherings and deliberations that cannot be overestimated.

Mr. Schumann, who is now in his 52d year (but looks much younger), acquired practical knowledge of the foundry and machine business, besides instruction in mechanical and civil engineering, at Richmond, Va. On the breaking out of the war he became assistant engineer on the staff of the chief engineer of the Army of the Potomac, being attached to the headquarters of General Meade. At the close of the war he was engaged in railroad surveys, after which, late in the sixties, he was appointed civil engineer of the supervising architect's office in the United States Treasury Department at Washington. Fourteen years later he resigned this office to take charge, as manager and superintendent, of a foundry and machine shop, which he conducted for seven years, and then established the firm of Schumann & Lynch at Tacony, Philadelphia, Pa.

Later on this firm was changed into a corporation called the Tacony Iron and Metal Co., of which he is now president and general manager.

Among the other achievements of a remarkably busy life the work published by him some time ago, entitled "Formulae and Tables for Engineers and Architects," deserves especial mention, as also a very valuable work on "Heating and Ventilation." He was at one time member of a commission presided over by the late Prof. Henry, of the Smithsonian Institute, for correcting the heating and ventilation of the United States Capitol at Washington, and is now engineer-in-charge of the construction and erection of the metal work of the City Hall tower in Philadelphia. This structure is 548 feet high, surmounted by a bronze statue of Wm. Penn, 38 feet high and weighing 54,000 pounds, besides four other groups of figures, each 24 feet high. This work is now being executed at the works of the Tacony Iron and Metal Company.

In personal appearance Mr. Schumann is tall and dignified, with a pleasant, engaging manner, and naturally, from a gentleman of his attainments, a splendid conversationalist.

Mr. Howard Evans, about whom much has been said and written by his friends as being the "ideal secretary," is treasurer of the new association.

Some of his friends, and they seem to be the ones who know him best, insist that he is responsible for the entire Foundrymen's Association idea, and that he is really its "father." As he is not known to be the father of anything else, the reason of his lavishing so much of his affection on his "own and only" is easily understood.

HOWARD EVANS.
TREASURER AMERICAN FOUNDRYMENS' ASSOCIATION.

Mr. Evans is a partner in the firm of J. W. Paxson & Co., has been in the foundry supply business all his life, and likes it as well as those who enjoy his acquaintance like him.

Pokey's Pointers.

Old Nick Yahoo has the honor of being the proprietor of the Eclipse. Curious, how we come to call some people old; seems to be a case of contempt, bred by familiarity, fostered by custom, and, after all, in most places, used with nothing but respect. When Nick Yahoo first started the Eclipse, the citizens of Big Bend used to look up at him as if he were a morning glory and call him Mr. Yahoo. When they got better acquainted with him they changed this to Nick Yahoo, and when they found out that he was hard up, and had a mortgage on everything he had, except his wife, they saluted him as Old Nick.

Nick is a competitor of Pokey's, runs two heats a week, and does everything about the Eclipse, from keeping books to mixing clay-wash. Nick and Pokey do not hitch; like most all foundry men who are near neighbors, they love to get a whack at one another and only condescend to pull together when some common calamity threatens to smite both of them. Nick came in yesterday to ask Pokey if he knew what was good to give a horse for the heaves, at least, that seemed to be his errand, though presently he forgot all about horse doctoring and turned towards foundry matters.

"Did you ever see such darnation times, Pokey? First one thing falls on us, and then another, now the pig iron men ain't going to give us more than thirty days to square up in and the men want their pay every week, while our customers wants a year before making final payment, seems as if we have to sell castings on the installment plan. I think that the storm center is about central in our business just now."

"Yes, and we fight so much between one another that it draws the clouds our way, every time anything strikes us it hits our pocketbook."

"That is no lie. Did you hear the men say anything about getting paid for overtime?"

"Did I, Nick, suffering Columbus, I should say so, are they after you, too? What are you going to do about it?"

"I am going to fight," said Nick.

"And so am I," exclaimed Pokey, earnestly.

"There was a time when men were glad to work," Nick went on. "But, nowadays, they are getting too particular, raise a regular rumpus if the engineer blows the whistle a couple of minutes late, and even had the gall the other day to tell me that my old clock was no good. I know it needs cleaning, but it ain't much use, for it will only get full of dirt again."

"Let us go out to the foundry, long time since you have seen a decent shop, Nick."

"Which means that my shop is indecent. I don't believe in too many improvements, Pokey, makes the men lazy, better keep them busy doing something instead of letting them watch the machinery doing the work."

"What is the matter with keeping them busy and the machinery, too, Nick?"

"All right if you can manage it that way, Pokey, but I never could, seems as if the minute I take my eyes off the infernal rascals they are killing time. What do you think ails them, anyhow, Pokey?"

"What are you paying nowadays, Nick, if it is any of my business?"

"From a dollar and a half to two dollars."

"And what do you expect for twelve shillings? Here is Tom. Say, Tom, Nick and I are going to fight. What do you think about it?"

"No use of telling me, I don't want to be referee. Guess it will be a draw if you are going to fight the old way, with your jaws."

"Now, Tom," said Pokey, rather sternly. "Don't get so infernal sarcastic. We are in dead earnest about it. We are going to fight the men on this pay for overtime matter. We will show them a lesson and learn them that we intend to run our own business."

"Yes, Tom, we will defy them to do their worst, we will break it right off in them. They are getting so that they know too much and we propose to swamp them," said Nick excitedly.

"Don't talk so loud, Nick, some of them might hear you," interrupted Pokey.

"Don't care a snap if they do. I am ready to fight, ain't you, Pokey?"

"Yes, but don't let them know about it too soon, or they may steal a countermarch on us. Be cunning as a fox," cautioned Pokey.

"What is the trouble, anyhow?" inquired Tom.

"Don't you know?" said Nick and Pokey in a chorus.

"No, gentlemen, I don't."

"Well, Tom, the consolidated Trades Assembly has notified us to the effect that after the first of August we will have to pay for overtime. They want to send a committee down next week to adjust the matter amicable."

"And we will adjust it, in the small end of a horn," said Nick, tired of not finding a chance to show how bad he wanted to say something. "We will adjust it when we can't find anything else to do."

"Ain't you going to meet them?"

"Not much, Tom," Pokey went on. "I don't mind to meet a set of men representing our own employes, if they have any grievances and are acquainted with the circumstances, but I want to steer clear of delegates from the Trades Assembly. It will be a shoemak-

er, a printer, a musician, a candy maker, and may be one little shriveled up molder who hasn't got a word to say. The others have got all the gab and monopolize the time. Now, Tom, how can a painter reasonably be supposed to be capable of presenting the molders' cause. You might as well try to talk to a Dutch bologna sausage."

"That is what I say, and Tom," interrupted Nick. "The last time there was a dispute at my place two butchers came down as delegates to adjust the trouble in the foundry. What do you think of that, Tom?"

"Appears to me as if they were in their proper place for some foundries," slyly remarked Tom.

"And how do you make that out, Tom. Do you a kind of lean their way?"

"I don't know whether I do or not, Nick," said Tom, rather savagely, then as he closed an eye, the one next to Nick, and winked the other one at Pokey, he went on, "I suppose you know, Nick, that some foundries are slaughter houses."

"Pointer for you, Nick, do you want to hire any butchers? You are running a tough joint, anyhow," said Pokey laughingly, as Nick seemed to be wrestling with something that made him keep his face straight.

"Laying all joking aside," Tom resumed, "There is no excuse whatever for having any disturbance in Big Bend just now."

"And how will we get over it?" said Pokey.

"Yes, show me how," from Nick.

"Pay them for their overtime."

"Good gosh, Tom, do you think I am a National Bank?"

"Or, do you entertain an idea that I don't have to pay house rent and taxes," said Nick.

"It is the cheapest way out of it," insisted Tom.

"The cheapest?" said Pokey.

"The cheapest?" seconded Nick.

"Certainly it is."

"But it doesn't pay to work overtime," said Pokey.

"That is what I have found out, too," Nick responded.

"Are you both agreed on that?" asked Tom.

"Most assuredly," said Pokey.

"Certainly," said Nick.

"Let me ask you a question then, what do you do it for?"

"What do we do it for," said Pokey.

"I don't know," replied Nick.

"Both of you say it doesn't pay, at least not when you get it done free of charge," Tom resumed. "Then why not quit it? Most of our overtime is caused by some little job coming in. The other afternoon old Taylor upset his threshing machine and nothing would do but that he must have all the broken castings replaced that night, it didn't take 300 pounds of iron, and what profit did we make on it?"

"Well, others would have done it," interrupted Pokey.

"Let others have that kind of jobs then or else put in a very small cupola that will melt a few hundred pounds of iron for such customers. We might lose a few cents on a job then, but I would rather miss five dollars than be running the shop overtime without paying the men for it. It spoils their work the next day. We gave Pokey an hour last night, they will say, no wonder he is getting rich, and then they will kill time enough to satisfy themselves that they are even and got interest on what they invested, too."

"But our own work interferes sometimes."

"Yes, it is made to do that. If you don't look for a thing till you want it, and it isn't there, then, of course, the pattern comes out here marked "Rush," though sometimes there appears to be no reason for it. I have rushed out castings as if we were going to close down forever that night and they have laid around in the machine shop for a week without being touched. If a mold drops it becomes customary to let the shop stand around while it is being patched. Overtime that you pay for don't pay, you say; overtime that you don't pay for pays a great deal less. Men standing still in a foundry don't make anything, might as well have mummies. Dead men are worthless, while men are in the shop keep them moving and pay them for it, have it run regularly and the output will be greater than if you are operating it so that the men have to go home on the owl cars."

"Well, if you think you can get the wind on in time, you might try it, Tom."

"I can get the wind on and I want to caution you to have coke and iron on hand. The other night we had to send a team over to the Enterprise to get enough to finish the heat."

"Our car was delayed."

"Certainly, but why not order enough of it in time to avoid this, it has always been the trouble here that nothing was ordered till the last minute. May be you think materials reach further in this manner, but when you count the cost of making connections where are you at?"

"Most of these things are nothing but habit, Tom. Custom makes laws, and some it has made for the foundry are all fired out of date. After they are gone people will wonder why they ever tolerated them so long. Just keep on agitating your thinker, Tom, and we will put our heads together and repeal the worst of them."

"I must be agoing," says Nick. "If the men find I am away they will make statues of themselves."

"Well, are you going to fight?" Nick asks Pokey as he is leaving.

"Fight, what for, Nick?"

"Against paying for overtime."

"Not much, Nick, wouldn't we be a fine pair of zebras to fight for something that didn't pay us?"

"I am a kind of doubting myself."

"I am going to take Tom's pointer," says Pokey. "I will never fight for anything not worth fighting for."

"Tom seems to be quite a fellow, but he is a little too smart to suit me."

"I guess he is," says Pokey. "Do you want to hire any butchers?"

The Delusive Grate-Bar.

By H. HANSEN.

A remark made in these pages sometime ago referred to the simplicity of making grate-bars. It took the writer's memory back a few years, and unfolded as bright and vividly as if it were yesterday the experience he once had while trying to ride a grate-bar bare back. At that time we could do bigger jobs than we can now, or at least we thought there was nothing about a foundry that could back us off. We had been petted around until our common sense got disgusted and left, its place being taken by conceit, we could do wonders with our mouth and a tolerably fair job with our hands, that is when the signs were right. Of course, if the patternmaker and coremaker didn't do their work right, and we lost a casting, no blame could be attached to us.

A grate-bar job came to the shop and first one and then another had a whack at it and held it down for a couple of days and then pulled their freight, the usual way for a molder to try and show his innocence when things go wrong. But, of course, there was nothing strange about these molders not being able to produce a labyrinthian grate-bar for they were nothing but just common every-day plug molders, in our opinion. It never occurred to us at that time that anybody else made a difficult job, and as for them being up to our standard, that was out of the question.

One morning the old man came over to us and complained about not being able to get the grate-bars and wound up by inviting us to try our luck at it. What? Work on grate-bars? Not much. Of course, as far as making them was concerned, we could easy do that, but the idea of a mechanic working on grate-bars! No, that was asking too much of a nineteenth century molder. Did we ever work on them? the old man asked us. Why, no, we had never been so low down as that. To be sure anybody could make grate-bars and we wanted work that anybody couldn't make. "Anybody can't make those bars, tried everyone that would be likely to succeed, now just try your hand, Henry, and I will raise your pay a quarter," pleaded the old man. We yielded to the temptation of the quarter, and how we suffered for it later.

It was not only the quarter that influenced us to come the old man's way. It tickled our vanity to think with what grace we would slap those bars up. We laid awake half the night previous to starting in, just picturing to ourselves the proper size for us to blow up to when we made them and beat the oldtimers, we would show them what a first-class man could do. The next morning that we had been longing so much for came, and we had our overshirt pulled off and sleeves rolled up, before the whistle blew, ready to make a race. We intended to scorch along and make the rest of the men feel their utter inferiority, we would prove to them that we were indeed a star, and could back it up when occasion required.

The patterns were well made, and we remarked to the last victim of the job that a man who couldn't yank such patterns out of

the sand with his feet should lay no claim to being up to date. We warmed right up to our work, and by eleven o'clock the eight flasks that constituted a day's work were clamped up ready to be poured off. Now was the chance for us to get in our fine work and we walked up and down the gang-way feeling like Sullivan did one day in New Orleans before Corbett made him homesick. The old man complimented us on the ease with which we took hold, and we agreed that the job was a snap, but took care to add, loud enough so that a couple of the molders could hear it, that it was easy to do a job when a man knew how, and, of course, there wasn't the job in existence that could offer any obstacles strong enough to withstand our everlasting battery of knowing everything.

That afternoon was the last time we entertained this idea, however. It was the last day we thought that we had a corner on the molder's trade, or that anybody could make grate-bars. When we started to pour off the first bar a rumbling noise, like that of a passing train, was heard inside of the mold. but of course that was all right, many a casting had done the same thing and still been accepted. The second one gave a heave as it came up, but settled back again, and, no doubt, that was all right, too. It went along that way with all. each one gave some sort of a manifestation that the iron was not very cordially received on the inside. The last one, as if to emphasize this fact, sent the iron towards the roof, burned the helper and started a fire in our coat on the wall. That was one that was gone, we knew, but we had seven good ones, not so very bad for the first day, though we wanted to make it a ringer, as we never lost a casting from any fault of ours, and there was not much chance for excuse here with good patterns, we had owned up to that, and no cores at all to carry the blame and help us out. We went home determined to lose no more than that one, and early the next morning were on hand ready to repeat our performance of the previous day.

But we never repeated it. The sight that met our gaze caused us to swallow a chew of tobacco, and resulted ultimately in keeping our mouth shut and doing some powerful hard thinking for many a day thereafter. There were the eight bars laid out ready to be taken to the graveyard. They were all more or less pneumatic, except the one that blew up, and that seemed to have been caused by a too high pressure of air. We were viewing the wreck as the chief mourner and trying to appear unconcerned when the old man came over to offer his condolence. "Stick to it and you will get them," he said. We stuck, because we were stuck anyhow, and too stubborn to refuse to acknowledge ourselves beaten. It was the same old story day after day, sanguine hope in the morning, despair at night. We worked fast and slow, tried all kinds of kinks and schemes, still that grate-bar repelled all our advances. The pig iron was disappearing and being converted into grate-bar scrap. "You make it handy for me," says Pat, "they break easy. I wonder if they couldn't make pig iron with a vacuum in the center like that." We felt like murdering him. Every time anyone looked in our direction our conscience was accusing us. Our peace of mind was destroyed and as for our reputation it was lacerated and entirely unrecognizable, and we felt like trading jobs with the man who was acting the part of a roustabout. And all of this on account of a grate-bar, too, such a simple thing, we could catch a hold of it any way we liked to, and when the wrestling was done we were on the bottom while the grate-bar was a triumphant victor. We got a large follow board and put it up so as to shield us from the penetrating glance of our shopmates and somebody marked on it: Ten Cent Show. Then we got mad and said that we could lick the man who committed such a breach of etiquette, and he licked us. We wore the varnish off the pattern without producing a single bar, and when we went to the patternmaker and applied for a new coat, he remarked that it seemed like wasting good materials. We suffered the torture meted out to those who are stuck on themselves before we got the necessary information needed to make a grate-bar, such a simple thing.

For several years thereafter we were ashamed to own up to having been floored by a grate-bar before we realized that there is nothing dishonorable in making a failure. We have been fooled by many more of these little insignificant jobs since then and cultivated a respect for small things that only comes to those who attempt to handle them and find themselves minus perseverance and patience. And, as for the saying, that "anybody can make a grate-bar," if there is to be any argument about it, we like to be on the negative side.

CAST IRON NOTES.

Devoted to inquiries from Practical Foundrymen on the subject of Melting and using Cast Iron. Address all Inquiries to W. J. KEEP, care of The Foundry.

How to Gain a Knowledge of the Nature of Cast Iron.

The first thing for a founder to learn is that there are facts regarding cast iron that he doesn't know, and next for him to feel sufficient interest in the subject to ask questions. The lack of interest on this subject among founders seems unaccountable when it is realized that by intelligent management at least $1.00 per ton on the cost of the iron charged into the cupola can be saved, and at the same time have greatly improved quality and a much larger yield of castings. This saving at both ends and in the middle amounts to more than all usual profits. Nine-tenths of the inquiries that come to us are too voluminous to publish in CAST IRON NOTES and are answered by personal letter. To show the readers of this column the kind of questions a founder should ask, I will give one series of answers to questions that I am sending out by this mail. The questions begin as follows: "As you kindly offer to reply to our questions, and as we are now controlling our foundry mixture by the shrinkage of a half inch test bar, we would like more information on the following:

THIN BARS—What is the purpose of the thin bar cast along with the 1-2-inch square bar? We find that the thin bar will chill at the ends from one inch to two inches deep, whereas at the center it is chilled only at the edges. Is this as it should be? What particular qualities are shown by this thin test bar?

ANSWER: One thin and one square bar are cast in yokes each day to give a relative measure of shrinkage. The depth of chill is measured by breaking off one corner of the square bar. The thin bar will show a tendency towards chilling in the sand mold which the square bar will not show. The thin bar should be broken square across near the middle. For light castings the grain should be an even gray with no tendency to chill at the edges, and heavy castings will be better if the same fracture is seen. You must, however, find what fracture this bar has when you are making castings that are perfectly satisfactory. More white in the fracture indicates hardness and vice versa.

QUESTION: SHRINKAGE—As so much variation in the shrinkage is found, what are the limits you would advise us to keep within for our light machinery castings? Would you kindly give us this shrinkage limit in actual figures (instead of comparisons) both for our light and heavy work?

ANSWER: The measure of shrinkage shows the influence of the silicon in the casting as modified by all the varying conditions existing at the time the casting was made. With any individual mixture an increase of silicon will diminish shrinkage and vice versa. There are no definite limits that can apply in different foundries. Find what shrinkage accompanies your satisfactory castings and call this your standard. If the shrinkage is higher than this standard increase silicon next day. Never mind what others do but be governed by your own standard, (.160 is a common shrinkage for heavy castings and .140 for light machinery.

QUESTION: SILICON—What in your opinion are the percentages which it would not be wise for our work to go under or to exceed? There must be some definite narrow limits within which it should be possible to stay in order to maintain the required qualities in the iron, and we should be exceedingly obliged if you would give us as definite an idea as possible, what percentages of silicon you consider would yield the best results. We understand that in a paper read before the Mechanical Engineers you gave the ratio of proportion of the silicon to the shrinkages. If a shrinkage of .125 inches per foot of a 1-2-inch square test bar indicates 3.50 per cent of silicon, would this be too soft iron for our work?

ANSWER: There are no narrow definite limits with cast iron. The variation of any one of a dozen conditions over which you have no control will vary the influence of silicon. It is the influence of silicon on the physical quality that you are after and not the percentage. The measure of the influence is the shrinkage. More silicon will generally reduce it, but there are exceptions. There are, however, so few exceptions that you are safe in always trusting to

such additions. Any ratio between the chemical composition and physical quality must be merely an approximation. I give such ratios as a matter of convenience for reference, but always state that they are approximations. They are found by comparing a large number of carefully made physical tests and chemical analysis. The same conditions could never be found again and therefore definite statements regarding cast iron must be understood as referring to what has been done under certain conditions. The actual percentage of silicon in any casting can only be found by chemical analysis, but in one case 1.50 per cent of silicon will produce as soft a casting with as low a shrinkage as another iron with 2.00 per cent of silicon. If the carbon is low in the pig iron it will need a greater percentage of silicon to produce a given physical result. The founder sells his castings for their physical quality and it makes no difference to him or to the purchaser whether the desirable quality is produced by more or less silicon, or whether the coke used in melting contained more or less sulphur. The relation of chemical composition to physical quality is a perplexing subject. The only solution is to measure the physical quality by a physical test and add more silicon to decrease shrinkage chill and hardness. This will make more money for you than any other method. In what you would call heavy castings 2.00 or 2.25 per cent silicon would probably give you a shrinkage of .160 and 2.75 or 3.00 per cent probably .150. To get .140 shrinkage you would likely have to use 3.25 per cent. 3.50 per cent silicon with the very low shrinkage of .125 will be found in soft stone plate castings and such iron would be too soft and too expensive for light machinery castings.

QUESTION: STRENGTH—How does the silicon affect the strength? What limits do you advise for our work as to strength?

ANSWER: With any given mixture, generally an increase of silicon increases the strength of small castings and decreases the strength of large castings, if both are poured from the same ladle. Aside from this general statement, it is very fortunate that strength can be increased independently of chemical analysis. The character of the grain which is purely a physical quality determines the strength and by changing the proportions of the irons in your yard you can increase the strength and still keep the shrinkage uniform. The only way to do this is by experiment. You will find irons that when put together will give you best results. Other shipments of these irons will vary and you may have to change the proportions to keep the strength up. Always try to keep the strength of a 1-2-inch square bar above 400 pounds, and make 450 your standard whatever your work, but you will not always reach it.

QUESTION: DIAGRAMS OF STRENGTH—What are your suggestions regarding those we send you?

ANSWER: Sharpen the pencil so as to make a sharp, narrow mark and run the machine so slow as to make a smooth record. This record shows strength of the test bar and shows the deflection and set for each load. It is best to record the shrinkage and the iron mixture on the same paper and to label 1-2 of one test bar and preserve all carefully.

QUESTION: CHILL—We find the chill varies considerably, from 0.20 to 0.45. For machinery castings required here what should be our limits for chill?

ANSWER: Depth of chill does not depend entirely upon the chemical composition of the iron. The chilling tendency was imparted in the blast furnace, and is a tendency for carbon and silicon and iron combine in certain proportions when cooled suddenly. Another iron of apparently the same chemical composition will not chill at all. 0.20 is a low chill for a shrinkage of .160, but 0.45 would show iron fitted for chilled castings. Experience will show you which iron brings the chill into the castings.

QUESTION: FRACTURE—Have you any especial matters to direct our attention to with reference to the observation of the fracture?

ANSWER: A uniform close grain; no closer at the edges than at the center is best. The degree of grayness indicates degree of softness. Everything regarding cast iron is relative, that is one way or the other from your own standard.

QUESTION: HARDNESS—Is the test for hardness the same as for chill?

ANSWER: Low shrinkage, low chill, dark fracture, open grain, large deflection and large set indicate soft iron.

QUESTION: FUEL—We notice you mention "coke should be of ordinary good quality." You thus allow the influence of bad fuel and we presume you do not consider an examination misplaced. Kindly say whether the sulphuric acid and the water test would prove the quality of the coke.

ANSWER: Coke deficient in heating quality, which means high ash or low carbon, or which contains excessive sulphur, or which breaks too easily, will make poor castings. The foundry conditions are peculiar. When the car of coke arrives it must be at once unloaded onto a pile with other coke, or it must be at once put into the cupola. There is no chance for analysis and it would do no good. If the producer loads poor coke on the car the damage cannot be prevented. There are brewers and plenty of others to whom he can ship inferior coke, and he need only send the bright, clear, light, strong coke to the founder. Insist on the best coke being sent, but if you find it impossible to get better coke and you feel like ascribing the high shrinkage and hard castings to the coke, increase the silicon and you will at once counteract the influence of sulphur in the coke.

(To be continued.)

Harriet Beecher Stowe's Last Letter.

The last thing written by Mrs. Harriet Beecher Stowe, only a few days before her death, was a loving acknowledgement to the public for fond remembrances and tokens and expressions of affectionate esteem, on her 85th birthday, which she sent to The Ladies' Home Journal. In the next issue of this magazine it will be published in fac simile. It reflects the beautiful nature of the gifted authoress, and by her death has become her last message to the American public.

Questions and Answers.

We are making some match plates and are having trouble on account of the shrinkage. Can you suggest any plan that will obviate this difficulty? Is it true that bronze does not shrink? Is it practicable to make patterns and match plates of bronze?

Personal.

Mr. Frederick Davey, for over fifteen years superintendent of the Sessions Foundry at Bristol, Conn., has resigned his position with that firm and a week or so afterwards his many friends presented him with a handsome gold watch and chain, as a souvenir of his many years' services. W. H. Stafford, formerly with the Phoenix Foundry at Providence, succeeds Mr. Davey.

Books, Exchanges and Catalogues.

Timmis & Clissold, of Bound Brook, N. J., send us a neat little catalogue of over thirty pages describing their line of Pattern Shop supplies. Judging from its appearance it would look very much as if they were engaged in the business to a most extensive degree. The catalogue illustrates their full line and if some of their supplies were more generally used considerable trouble in both foundry and machine shop would be averted.

Fire Fiend.

The Foundry of King & Walker Co., at Madison, Wis., was almost destroyed by fire July 11th.

The Quincy Foundry Facing & Supply Co. suffered from a most severe fire July 11. Their plant was almost entirely wiped out, but it is understood will be immediately rebuilt.

New Foundry Enterprises.

Lawton & Pratt's new Foundry at Fair Haven, Conn., is nearly completed.

The Pekor Iron Works is the name of a new Foundry just started at Columbus, Ga.

The Wayne Agricultural Works, at Richmond, Ind., will enlarge their Foundry.

A sixty-foot addition is being added to the Flemington Foundry at Flemington, N. J.

The Casey & Hedges Co. will build a brick Foundry at a cost of $10,000 in Chattanooga, Tenn.

There is some talk of Mr. Alex. Dunbar, of Woodstock, N. B., erecting a Foundry at Fredericton, N. B., before long.

The Walker & Pratt Manufacturing Co., of Boston, Mass., have purchased a large tract of land at Union Market, near East Watertown, and will erect in the near future a large modern stove manufacturing plant, abandoning their present plant at Watertown.

The new Foundry of P. & F. Corbin, at New Britain, Conn., is in operation. This company have adopted the unique plan of locating their Foundry on the top story of a high building and seem to think that it possesses many advantages over the ordinary ground floor plan.

GROUP OF DELEGATES IN ATTENDANCE AT MEETING OF AMERICAN FOUNDRYMEN'S ASSOCIATION.
PHILADELPHIA, MAY 12TH, 13TH AND 14TH.

VIEW IN UPPER LEFT HAND CORNER SHOWS FISHERMEN LOADING BOAT WITH SHAD FROM SEINE. TAKEN AT WASHINGTON PARK, ON THE DELAWARE,

A Substitnte for Window Glass.

This great inventive age in which we live continues to offer almost daily some new and wonderful discovery, with the aid of which the material comforts of life, business and pleasure are greatly increased. This is so universally acknowledged to be true that no illustration is needed to make more clear our meaning.

If it were, we could not do better than to point to the most recent article to attract our attention. How many of our readers have experienced the annoyance caused by breaking or broken glass in Foundry roofs or skylights, to say nothing of the damage sometimes caused by the glass itself or from the admission of the weather through the place where the glass ought to be?

The great objection to glass for use in skylights is that it breaks so easily. As glass is not flexible, or elastic, sudden changes in temperature, extremes of heat and cold, expansion and contraction, storms, blows, and other causes break it. Further, if the glass is set in putty, the sun will dry the latter, causing it to crumble and fall away. This allows the joints to leak.

Translucent fabric has all the advantages that glass possesses for skylight purposes. It transmits a large amount of light, and makes a thoroughly durable roofing.

The great advantages which it has over glass for skylight purposes are that it is flexible and practically unbreakable. Storms, blows, extremes of heat and cold, expansion and contraction, variations in forms of roof structure, and other causes which have such serious effects on glass, will not, it is said, injure it in the least.

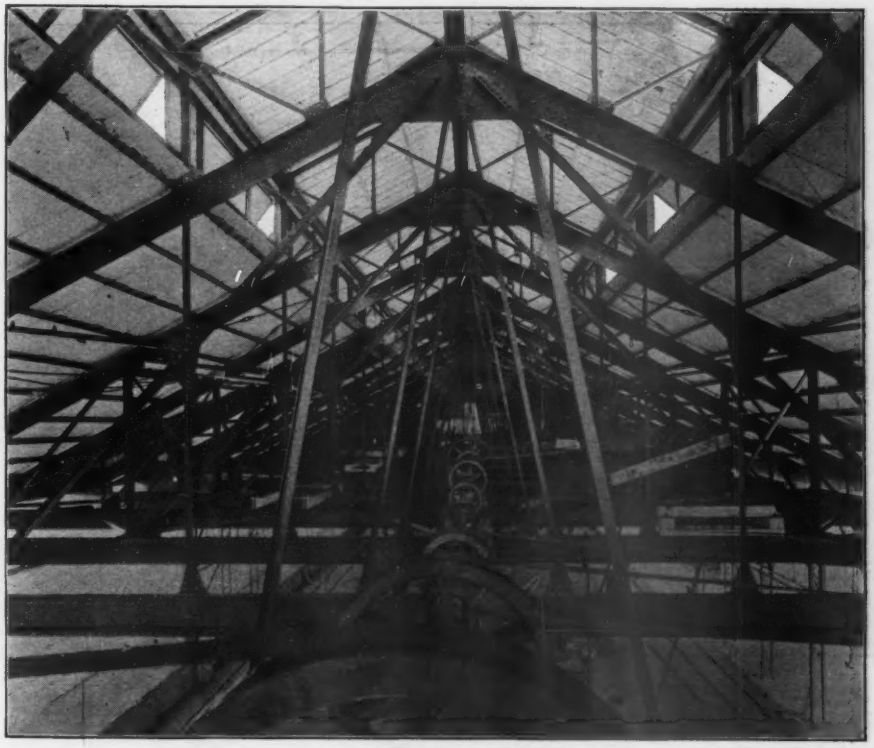


FIG. 1—TRANSLUCENT FABRIC SKYLIGHT AT SHOPS OF BERLIN IRON BRIDGE CO.

The Fabric is very strong, and in panels 18"x3' has stood a weight of over 400 pounds to the square foot, without showing the least fracture.

The method of setting this material in skylight frames is different from that re-

quired for glass. Instead of setting it in putty, the Fabric is stretched on wood frames and fastened with nails. As it is flexible, joints can be made with it in the same manner that joints are made with tin roofing, and if properly constructed, they will always be absolutely water-tight.

In Foundries where skylights are subjected to such severe conditions, and where they are very often of a very large area, this material will be found of especial value.

As these buildings are generally one story high, and spread over a large amount of ground, it is almost impossible to have them properly lighted unless skylights are used. With Translucent Fabric, skylights of any size or form can be built in the roof, and as the material makes its own flashing and joints, these skylights if properly constructed should never leak.

This material has been in use in skylights for over six years, and during all that time the claim is made that they have never leaked, or cost anything for repairing, and the material is just as good to-day as when it was put in.

It is now being used extensively by many of the largest manufacturing concerns in the United States. The Berlin Iron Bridge Company, of East Berlin, Conn., have on their new forge shop, a Translucent Fabric skylight which forms the roof of the monitor. It is about 300 feet long by 18 feet wide. This is illustrated in the accompanying cut, Fig. 1. Besides the above skylight, this company have used about 6,000 feet of the Fabric in skylights on some of their other buildings.

The General Electric Company, of Schenectady, N. Y., have recently completed some new shops in which they have over 14,000 square feet of Translucent Fabric skylights. We illustrate one of these skylights herewith, Fig. 2. They are each 350 feet long by 16 feet wide. Besides these this company have a number of other Fabric skylights in use, and altogether they have used, within the last year, over 17,000 square feet.

FIG. 2—TRANSLUCENT FABRIC ON SHOP OF GENERAL ELECTRIC CO., OF SCHENECTADY, N. Y.

The Hartford Street Railway Company, of Hartford, Conn., are also large users. They have the roofs of five monitors constructed of Translucent Fabric on their car-

barns; the largest of which covers nearly 4,000 square feet. Altogether they have about 11,000 square feet.

Many other large concerns are mentioned as users and in all cases they are said to be pleased. The Translucent Fabric Co., of Quincy, Mass., are the sole manufacturers, and will be glad to furnish illustrated catalogues and other information.

CORRESPONDENCE.

Oaks From Little Acorns Grow.

Ed. Foundry:—The foundryman, whether he be a foreman, journeyman, or apprentice in this age certainly has no just reason to complain at not having facilities to help enlighten him in all the finer points connected with his trade, and I sincerely hope the day is not far distant when it can no longer be said the foundry is a place to dump blockheads and pound sand, and if asked what your occupation is that you will not have to answer, in a half-hearted and apologizing way that you are a molder.

As at the approach of spring, buds may be seen springing up and nature awakes from its winter nap, so is everything that relates to the foundry interests awaking from its lethargic condition, and it seems as though on every hand we hear the cry of Eureka (I have found it). Found what? Ask the proprietor, and he will tell you he has just found out the fact that he has discovered a part of his plant that has never been given any thought, called the foundry; a place nearly roofless, with holes on the sides stuffed full of old overalls and bottom boards called windows; in fact, it has been a discarded Ishmael too long, and I am going to look it up. So he looks it up, the foundry gets a new roof, puts glass in the windows, a new furnace, and the foundry gets a boom that causes the molders to ask and wonder what is the matter with the old man, and Red Jack answers, "I guess he is readin' of some of them sayin's in these 'ere papers wots trying to teach moldin', and run a foundry."

The foreman and molders say, "We have found it." Found what? Found out the fact that there are a great many things in and around the foundry we never knew. We have found out that sand is a mixture, the component parts of which we never heard of before, and which should be understood; that the coke we use is a mixture of moisture, volatile matter, fixed carbon and ash. The iron we melt is a combination of combined and graphitic carbon, phosphorus, sulphur and silicon. We must look these things up.

The apprentice has found that to be a successful molder, and if he wishes to ascend to the top of the ladder, he will have to look these things up. He has found out that there are more than "100 things for an apprentice to know."

Whence comes this great change? Why this sudden revolution and springing Phoenix-like from the ashes the hitherto unknown foundry? In the past foundrymen in general were groping in uncertain ways, when, lo, one day in 1880-81 there appeared in one of the mechanical journals an article relating to foundry practices. This was followed by another, and then some other fellow concluded he would try it, and in this way new name after new name would appear from time to time attached to some article concerning the foundry business. I well remember some of the remarks that were passed by some of the know-alls as these articles were discussed, and as large oaks from little acorns grow, so from these articles published from time to time, crude as some of them were, discussions took place which took a leap, from the old three-legged foundry stove to the great national foundrymen's convention in the Franklin Institute at Philadelphia.

Too much praise cannot be given to those who started this little flame, nor to those who helped fan it to a blaze that has grown to such proportions as to warm the heart of every progressive foundryman in the land. Think of it, from Canada to the gulf, from Plymouth Rock to the Golden Gate, men came to talk about and discuss that black sheep of all plants, the foundry.

I hope the day is not far distant when every proprietor, superintendent, foreman, molder or apprentice in the land will find it necessary to read regularly some good periodical devoted to the foundry business. If what we read is not in harmony with our ideas it is easy for us to give our own and by that means add to the general fund of information.

F. B. SHAFFER.

Elizabeth, N. J.

Explanatory.

Mr. Editor—In your June issue I find a communication from Mr. Jas. A. Beckett entitled "More Criticism," in which Mr. Beckett coincides with Mr. Stone that my article in your April issue is somewhat disappointing, because I did not give reasons why changes in temperature and humidity produce the effects mentioned.

In my article I simply figured out the number of British Thermal Units (B. T. U.) needed to heat a certain weight of air through a given range of temperature, and the number of B. T. U. needed to change a certain weight of water or ice to vapor at a given temperature. I did not attempt to describe the various processes that actually take place while melting in the cupola. These processes do not affect the amount of combustible needed for overcoming the injurious effects of low temperature and high humidity in air.

There is no doubt a dissociation of the oxygen and hydrogen composing the moisture which enters the cupola by the blast. This dissociation involves a large expenditure of heat, which heat is returned when the hydrogen again combines with oxygen obtained from the air or other sources at a later period and at a higher point in the cupola. The theory of the conservation of energy teaches us that we cannot add any energy by reversing a process once gone through. In other words no more heat will be generated by combining the hydrogen with oxygen than was consumed by separating these elements. It is, therefore, immaterial to bring these questions into the discussion. Whatever the intermediate stages may be, our calculation must be based upon the original condition of the air as regards temperature and moisture when it enters the cupola and its final condition when it leaves the same. This is the method I pursued in my article in your April issue. I did not state that the changes mentioned are entirely due to moisture in the air, but I did state that moisture and variations in temperature do influence the melting of cast iron in the cupola. I also stated in my article that the temperature of the gases which escape from the top of the cupola varies greatly, but will be in the vicinity of 500 degrees F. for good practice. But here again I can see no advantage in figuring the various changes which occur in the intermediate period between the initial and final temperatures. What we must bear in mind is the temperature at which the air with its burden of moisture enters the cupola and the temperature at which it leaves the same.

I assumed the proportion of 8 to 1 simply as an illustration of good practice, but did not set it up as a standard of what is being done everywhere.

Mr. Beckett's communication is very interesting, in view of the long continued series of observations which he there speaks of. I should very much like to have him give us these observations and also would like to have him state what means he used for determining the temperature and humidity. Also what were the artificial means and how applied by which he kept the humidity of the blast uniform? Yours truly,

A. SORGE, Jr.

Chicago, July 3, 1896.

HUMIDITY AND CUPOLA WORK.

Mr. Stone Gives a Record of Some Heats.

Mr. Editor—I was very much gratified and also edified by reading the very interesting and instructive article on this subject, in the June number, from the pen of Mr. James A. Beckett. Mr. Beckett says that he found so much variation in results on different days when the humidity was the same, and the result, as a whole, so much at variance with what had been expected, that he had been led to believe there must be other causes, etc. This has also been my observation and I have frequently had occasion to wonder at the unexpected. But, after all, on mature reflection, I find that whilst an apparent successful cast is shown by the figures representing results, it is a fact that the quality of the product is not the same. At a low point of humidity everything goes off smoothly and the iron never changes its quality which is only the best. In my former letter I stated that our trouble from "bad" iron was much greater in summer than in winter. I think I am prepared to say, that, on a day when the moisture is high, the higher the thermometer, the lesser the chances for a good cast.

Now the iron I know the most of is from tin clippings or decarbonized iron generally,

which is said to be the most difficult to melt, and is more easily affected by general cupola ills.

I give below a few figures giving results on different days during the past month of June remarkable for its humidity generally. I regret not having kept a record also of the thermometer at same time, which I intend doing hereafter. The humidity was taken at intervals of two hours during casts and figures given are the average:

Average humidity.	Average pounds per hour.
27	3,035
30	3,153
34	2,700
37	3,431
43	2,122
45	1,048
46	1,914
50	2,790
52	2,826
57	2,444
61	2,649
63	2,092
64	2,312
66	1,024
69	1,946
74	1,496
80	1,829
89	2,174
90	2,975

This last record of 2,975 with the humidity nearest the maximum is very remarkable, and was to me the greatest surprise and very much of a puzzle. However, it is within only a few days that I have made observations of excessive heat or high thermometer. I remember now that on the day this particular cast was made I was on the point several times of having a fire made in the office stove. It rained all day and the dampness penetrated everywhere.

I hope your correspondents will keep it up until we get still more light on the subject.

C. E. STONE.

The Philadelphia Foundrymen's Association.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club, in Philadelphia, on Wednesday, June 3, the president, Francis Schumann, occupying the chair.

The treasurer presented a report dealing mainly with the expense of the late convention of foundrymen, and Secretary Evans, in a brief verbal report, outlined the part in the affair taken by the association.

The following were elected to membership in the association: W. L. Bowen, Hobart Iron Works, Hobart, Ind.; Jarecki Mfg. Company, Limited, Erie, Pa.; Walter A. Wood Mower and Reaper Company, Hoosic Falls, N. Y.; Dickson Mfg. Company, Scranton, Pa.; M. Hoagland Sons' Company, Rockaway, N. J.; Enterprise Mfg. Company, Philadelphia; F. B. Shaffer, Elizabeth, N. J., and P. H. & F. M. Roots, Connorsville, Ind.

W. T. Rainey, of W. T. Rainey & Co., Philadelphia, then addressed the meeting on the subject of

"The Manufacture of Coke and Its Selection for the Foundry."

He said: "There are several districts in this country where coke is made. The largest district is Connellsville, Pa. The mountain districts of Pennsylvania, West Virginia and a few other States are also coming into the market with cokes. The quality of coke depends upon the coal from which it is made. It is absolutely necessary that a good quality of coal should be used. It is not, however, necessary that a first quality of commercial coal be used, Connellsville coal, for instance, being little used except for the manufacture of coke. The coal mentioned is so full of volatile matter that it does not make a good steam coal, and when used for that purpose clinkers and clogs grate bars. After the coal is mined the process of coking is much about the same as adopted in all parts of this country. The coal is brought to the ovens in wagons or cars called 'lorries,' which discharge their contents, by means of a shute, into the ovens. The charge is about 6 tons of coal. After charging, the door is bricked up and covered with clay. The heat retained from the previous charge, and also obtained from the alternate ovens, which are in full blast, causes the distillation of gases, and these gases pass off through the top of the oven. The coal is allowed to bake in the oven for 48 hours, and at the end of that time the mass is thoroughly coked. The finished condition is easily ascertained by looking into the oven over the top of the door. A man then takes a long hooked pole and tears down the clay and brick from the door. This done, he inserts a piece of gas pipe attached to a hose and plays water on the fire until it is quenched. The coke is then al-

lowed to stand until the water is all driven off as steam. After the oven has been watered and the coke allowed to dry, the coke is drawn out with a scraper, a long iron bar with a hook on its end. It is then forked into wheelbarrows and wheeled across the yard, where it is loaded into cars.

"The method of charging the ovens is as follows: An oven is charged to-day and will be ready for drawing the day after to-morrow. For instance, an oven charged on Monday would be ready to draw on Wednesday; an oven charged on Tuesday would be drawn on Thursday; an oven charged on Friday must necessarily go over to Monday, and that is when 72-hour coke results. After drawing, the heat is kept in the ovens to help ignition on recharging. The fuel begins to burn and the coal starts to coke from the top downward. This is proved by the fact that if an oven charged to-day was by accident drawn to-morrow, a charge of coal would be found in the bottom. If the oven is allowed to stand without the coke being taken out it is soon consumed, and burns to ashes from the top of the charge downward. Seventy-two hour coke is always made when there is one day laid off between charge and drawing. A Friday or Saturday oven is therefore increased in charge, which entails a longer burning. A great many foundrymen have the idea that they can distinguish the difference between 48 and 72 hour coke. Now, I do not think any one living can tell the difference. I cannot.

"The Connellsville coke is distinctive, owing to its firm structure and porosity, and the structure, looking at the end of the piece, is flaky, making a hard breaking coke. There is a distinct ringing sound produced by striking two pieces together. It is these qualities which cause it to be considered superior for blast furnace use where the furnaces are built high. If the coke is not strong and hard it will be crushed down and thus entail difficulty in getting the blast of air through it. Very often a foundryman prefers coke having a silver luster on it. Such coke is certainly beautiful, but I have never seen coke silvery on the outside but what was black inside. When coal is properly coked there will always be a little raw coal in the bottom of the oven, which sticks to the coke. If there is no coal on the bottom of the charge the chances are that the whole charge will run high in ash, as the coke begins to burn up as soon as the coking process closes.

"In looking at a car of coke and seeing a little coal on the bottom, it is no indication that it is not properly coked. The piece of coke which comes from the front of the oven will always be a little spongy, sometimes very much so. This cannot be helped. Oven doors will leak a little, and curly and spongy coke near the door results. Perhaps there will be two or three wheelbarrow loads of that sort. The best coke comes from the heart of the oven. In furnace coke everything that comes out of the oven is loaded into the car. Foundry coke is selected, spongy coke and anything that may not look nice and bright being discarded, and that is the reason foundrymen pay more for their coke. Foundry coke is nearly always loaded in box cars, and this, too, adds to the cost. The slats in the door of the car and the packing against them is also an additional expense. The placing of large pieces of coke in the door makes the coke look nicer, and a careless arrangement often leads to a car of really first-class coke being refused.

"There is another coking process used a great deal in Europe—a by-product process by which the gases are saved from going to waste, and tar and ammonia extracted, the gas then being used for other purposes. The process is not used to any extent in this country, Johnstown, Dunbar and Syracuse having the principal plants. The coke made by the by-product process is different from the ordinary coke. The ovens are built 18, 20 and 25 feet long, and in parallel rows. They are closed up absolutely tight and have flues all around them, through which the gases pass. The coal is heated, but no flame is allowed to come in contact with it. The gases pass out of the oven, and after the tar and ammonia have been extracted from them part of the gases are brought back and burned under the ovens. This process makes a dense and very heavy coke.

"Coke from the West Virginia fields is usually a little more silvery than Connellsville, and denser, as you will see by a sample before you."

Asked whether the specific gravity in 72-hour coke was not greater than in 48-hour coke, Mr. Rainey replied: "No, it is not. If you bake a little loaf of bread beside a larger one, the larger one will take longer to bake through, but the result will be the same. It is the same with coke. A hard and clean coke that does not run too high in sulphur is best for foundry use. It should be fairly strong. What is known as 'mountain' coke differs in structure from the Connellsville coke. It is more open and porous and lighter, crushes down quicker, and is not a good furnace fuel for modern high stacks."

Asked what is the average ash in Connellsville coke Mr. Rainey answered: "It runs from 8 to 10 per cent. and varies." Continuing, he said: "The weather has some effect on coke, and exposure alters its appearance somewhat. Some people believe that laying coke out in the weather, even a little, injures it. I think this is a mistake. We once found some discarded coke which had been lying exposed to weather for nearly 20 years. When good coke was scarce we brought this old coke to the notice of a customer, and he used it, and pronounced it the best he had ever used. When coke is exposed the sulphur may work out, leaving a stain of iron, which mars the appearance of the coke. The best Connellsville coke should not run over ¾ to 1 per cent of sulphur. The coke region is 50 miles long and 1 to 3 miles wide, and the quality of the coal varies. If you go to the north of the district the coal is slaty and makes slaty coke. As you go south it improves until the neighborhood of Connellsville is reached. Further south it begins to increase in slate and runs high in sulphur."

The meeting then adjourned with the understanding that the next meeting would be held in September, thus abandoning meetings during the hot season.

Pittsburg and Vicinity.

The first half of the present year has passed without developing anything more startling than depressed trade and low prices. Comparing prices at the opening of January with those at the close of June, some lines show slightly higher figures while others are the same or a little lower. The first quarter of the year was quiet with prices falling in most lines, while the second quarter was a repetition only that prices held on longer and sagged very slowly.

Comparing the figures of January with those of June we find that No. 1 foundry lost about $1 a ton while those of No. 2 were about the same. The following table will show the range of prices for each month of the present year:

	No. 1 Foundry	No. 2 Foundry
January	$13.25@13.75	$12.50@13.00
February	13.00@13.50	12.50@13.00
March	12.75@13.25	12.00@12.50
April	12.75@13.25	12.00@12.50
May	12.50@13.00	11.85@12.20
June	12.25@12.75	11.75@12.00

The volume of trade each week seemed to be a little less and pig iron producers concluded to curtail the output somewhat. Many of the Valley furnaces closed down, and in other sections the production was lessened, so that the output for the month of May was the smallest of any since July, 1895.

Foundrymen are kept fairly well employed, but the plants could stand a great amount of more work. Some of the larger shops in this vicinity are running full time but with a greatly decreased force of hands. In some of the smaller foundries only two melts a week are being made. Were it not for the fact that some foundrymen desired to retain the good will of the buyers, they would refuse to accept any contracts and proceed to shut down their plants. There is little or no money being made by some of the operators in this district, and the immediate prospects for a betterment of the trade are poor.

The coke trade has not experienced any boom during the six months of the year, but has kept active right along. Shipments have been heavy from the Connellsville region, and the production has been equally as heavy. Below will be found the production and shipments in tons for the half year:

	Production, Tons,	Shipments Tons.
January	519,414	489,769
February	617,812	580,679
March	453,896	492,898
April	454,625	496,909
May	550,669	602,875
June	409,621	436,734

Prices for coke have held firmly the entire time, with furnace coke selling at $2; foundry, $2.30; and crushed, $2.35. Foundries running on pipe are well employed at present owing to the construction of numerous water works plants. Specifications are numerous for this kind of work and many bids are being made.

Roller Mill Castings.—Owing to the summer shut down among the mills for repairs the demand for castings has improved somewhat. Prices do not show any improvement; in fact, no change has been reported for some time past:

	Cents Per lb.
Chilled rolls, up to 12 inches	3¾
Chilled rolls, over 12 inches	3¼
Sand rolls and pinions, up to 12 inches	2¾
Sand rolls and pinions, over 12 inches	2¼
V tooth pinions, additional	¼
Housen and rolling mill castings	2
Squeezer castings	2
Squeezer pinions and wheels	2½
Spur and level wheels, large	4
Spur and level wheels, small	3

The Hydraulic Machine Company has just erected a new foundry building 150x100 feet, and an engine room and power house.

The Keystone Axle Company intends to erect a machine shop, foundry and two open-hearth furnaces to manufacture its own billets at Beaver Falls. The main building, in which the machinery for the rolling of axles will be installed is almost completed.

The partnership existing between Jos. S. Seaman, Robert Sleeth and Geo. P. Black, conducting the Phoenix Roll Works, of this city, has been dissolved by mutual consent, George P. Black retiring. The business of the former firm will be settled by Messrs. Seaman and Sleeth, who will hereafter continue the same business under the name and style of Seaman, Sleeth Company.

The foundations for the warehouse, foundry, pickling house and enameling house, of the Blackham Manufacturing Company, at Zelienople, have been completed and work begun on the iron framework of the building.

The Homestead Manufacturing Company is considering an offer to remove its plant to Media, O., where a free site and new buildings have been promised.

Application has been made to amend the charter of the Jas. P. Witherow Company, of New Castle, by changing the name to the New Castle Engineering Works.

The contract for the erection of the buildings for the United States Radiator Company at West Newton, has been let to Schull & Neff, of West Newton. The buildings are to be of brick, one story high. The foundry is to be 199 feet long and 52 feet wide.

Ground has been broken for the new plant of the Slaymaker-Barry Company at Connellsville. The main building will be 70x500 feet, brass and composition foundry, 40x110 feet, boiler house 30x50 feet. The buildings will be erected entirely of brick with steel framework, the construction being fireproof. Additional buildings are contemplated as soon as the plant is in operation, or even before that time, but the extent and character of these have not yet been determined.

Ten Great Foundry Centers.

The ten principal foundry centers of the country, with the number of iron foundries in each, according to a recent compilation are as follows:

1. Chicago, 90.
2. Philadelphia, 76.
3. Brooklyn, 57.
4. Pittsburg, 56.
5. Buffalo, 42.
6. New York, 34.
7. Cleveland, 33.
8. St. Louis, 31.
9. Detroit, 27.
10. Cincinnati, 26.

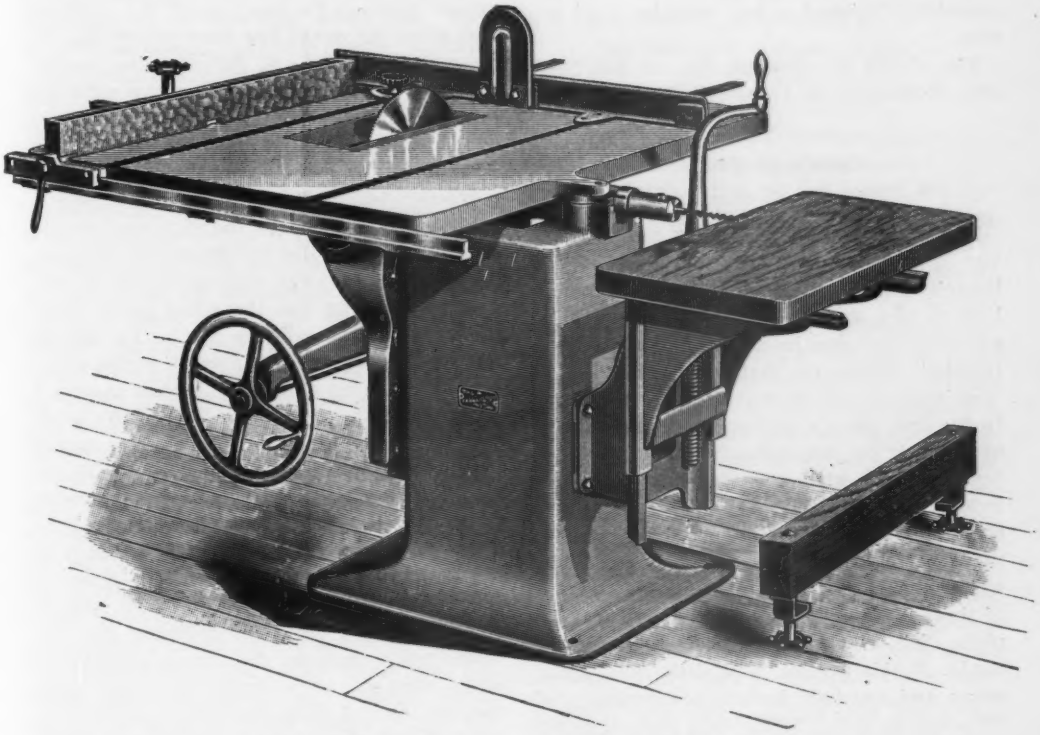
A Piece of Iron 2,000 Years Old.

S. T. Wellman, the well known metallurgist, of the Wellman-Seaver Engineering Co., Cleveland, has a portion of a round bar of iron—and a few like pieces are held in the United States—that antedates the Christian era by two or three centuries. The iron, which had been originally hammered into plates, and was deeply rusted from age, was found a few years ago by Dr. Karl Humann, in the ruins of the Temple of Artemis Leucophryne at Magnesia, Asia Minor. Dr. Humann sent it to Bismarck in April, 1894. It bore this inscription in German: "For you, Prince Bismarck, the iron chancellor, Hermogenes

forged this iron at Magnesia, 200 B. C. Humann found it in the Temple of Artemis after 2,000 years, and sent it to Hallbauer, who gave it the form in which it shall bear witness that your deeds shall outlive millenia." At the time of the presentation to Bismarck, Stahl and Eisen gave a photographic reproduction of the plate and an account of the discovery of the iron. The Temple of Artemis, one of the most magnificent of ancient monuments, was rebuilt about 300 B. C., though by some the date is put at 200 B. C. The metal is described as approximating steel in its composition, though closely akin to malleable iron. It was made at a low temperature and great care was necessary in the forging. It was found rather difficult to roll the pieces that were preserved as relics, these having a diameter of about one half inch. One analysis showed carbon 0.20 per cent; phosphorus, 0.016 per cent; iron, 92.71 per cent. Another gave carbon, 0.23 per cent; phosphorus, 0.0223 per cent; sulphur, a trace, with no distinguishable amount of manganese or silicon. An analysis in the laboratory of Prof. Ledebur showed 1.01 per cent of slag, 0.025 per cent of phosphorus, and 0.061 per cent of carbon.—Ex.

A Handy Machine for the Pattern Shop.

While it cannot be claimed that the pattern shop has been neglected to the same extent as the average iron foundry, yet there exists in many of them a demand for improved appliances, especially suitable for their kind of work, and that is capable of being adjusted to various uses.



A Patternmakers' Saw and Boring Machine.

The machine shown in our illustration is known as a variety saw bench with boring attachment. The frame is of the box pattern, cast in one piece. The table is of iron, rises and falls on gibbed ways by means of hand wheel shown in cut, tilts upwards from right side to an angle of forty-five degrees and one of the cut off gauges shown is adjustable to a miter in either directon, and may be used on either side of saw and special end stop gauges are furnished when ordered.

In addition jointing, dadoing, grooving and rabbeling heads may be easily attached by means of a large detachable throat plate surrounding saw and also shown in the engraving. The boring attachment consists of heavy slide warp, secured to the frame upon which a strongly braced table bracket is gibbed.

The table is also gibbed to ways on top of brackets and provisions made everywhere for taking up wear.

As all the fitting and workmanship is said to be first class and the journals have self-oiling boxes with provision for taking up any end motion it can easily be seen that it is especially designed to last and give good service.

The Frank H. Clement Co., of 336 Lyell ave., Rochester, N. Y., are the makers.

Aluminum Bronze.

BY TWINING CAMPBELL.

The writer is a plain foundry man without any large opinion of his knowledge of any branch of the business, but feels it is incumbent on him to explode a few of the theories advanced by many interested and some disinterested writers on that most deceiving of metals Aluminum Bronze (10 per cent Alloy). In the first place a perfect casting cannot be made in it by the ordinary first-class brass foundry man without experience with this metal, and then only small castings and large castings of the simplest shapes can be made perfect at any time by any one. The writer experimented at one time for a period of three months trying to make castings of a plain disk which it was necessary to have made of this metal. The disk was about seven and one-half inches in diameter and one and a half inches thick and weighed fourteen pounds. After many failures and trying other methods, I succeeded in making perfect castings, but on undertaking to make castings of the same shape that were three inches thick and sixteen inches in diameter, weighing one hundred pounds, I found that the same methods that made the smaller ones successfully did not apply for the large size, and, although I succeeded in making fair castings of this large size they were not perfect, and consider from experience it is practically impossible to make perfect castings of irregular shapes, weighing one hundred pounds or more. The writer has many times over tried the different methods recommended by different writers such as drawing the metal from the bottom of the crucible skim gates and many other things to no purpose. I have also made a plain iron cylinder with a perfect fitting bottom that is removable. In this cylinder bottom—there is a hole to correspond with the sprue hole in the mould. Having secured this cylinder to the mould right over the sprue hole, I have then lined the cylinder with a perfect asbestos bag and pour the metal into the cylinder which was first warmed. The metal would make the bag fit the cylinder perfectly. A proper plunger fits the top of the cylinder and after the metal has been poured in, the plunger is put in and force applied to the plunger, the pressure breaks the asbestos bag and the metal is forced into the mould as fast as the sprue hole will take it from the bottom of the cylinder where the metal is perfectly clean and requires no skimming.

Now, any reasonable foundry man would say if the mould did not wash and was perfect in vent, etc., the casting should be perfect for nothing but the clean metal from the bottom of the cylinder was in the casting, but from experience I can say it is the worst way to make an aluminum bronze casting I have tried; the reason for this is the large percentage of aluminum in the metal makes it so susceptible to the action of the atmosphere that wherever the surface of the metal is exposed it becomes coated instantly with a fine coat of oxide of aluminum, which is in the shape of an impalable powder. Now, as the cavity of the mould is full of air, and as the metal goes from the cylinder into the mould under pressure the stream breaks into many streams, each stream is coated with this fine film of oxide, and as the mould fills with metal those small streams of metal run together, but the coat of oxide will not permit perfect amalgamation, and if the mould is poured flat in the common way, the top of the casting will look as if full of scoria, and if the casting is put in the lathe and 1-2 inch cut taken across the top face it will show very many imperfections from this cause, and if an inch cut is taken the casting will still show the imperfections, but if the imperfections are so small as not to be seen by the naked eye they are still there, and if the casting is put into service the pressure of steam or water will show they

are there. Now, the only way to overcome this, that I have found is to place the pattern in the mould in such a position that the mould can be filled by pouring the metal into a well below the casting in the mould and have the mould fill gradually from the bottom upward, being sure to not allow the metal to flutter or bubble while the mould is filling and make proper risers on the casting to admit of the whole surface of the metal which has been exposed to the air to escape into the riser, which must be large enough to keep the casting from shrinking if very thick, as 10 per cent aluminum bronze shrinks much as steel does when cast. Ten per cent aluminum bronze is a most valuable metal to manufacturing trades because of its great tensile strength being much greater than any known bronze, and also because it can be worked under the hammer when hot into any shape. There has been hundreds of thousands of dollars spent in experimenting with aluminum bronze in order to find some method of producing perfect castings, which to the best of my knowledge and belief has not been done except in the simplest of shapes. As for melting it, I will say the copper should be melted first and the aluminum added after which it should be stirred and then poured into ingots after which it should be again melted before trying to make a casting. It is useless to stir the metal much after the second melting, as you can stir and skim every drop of metal from the pot, and after every stirring find the top of the metal in the crucible covered with scoria which is nothing but the oxide of aluminum and copper formed by the action of the air on the surface of the metal which was exposed when the metal was stirred. It is one of the most wasteful metals in use, because of this action of the air upon it. But, unlike any other bronze made from copper, tin, zinc, etc., it is never found spongy or full of air holes, no matter how hot it is poured and like all castings of other metals is much stronger if the skin is not machined off in any manner. I have cast 1-4 inch round rods and 1 1-2 inch round bars of 10 per cent aluminum bronze and 1-4 inch rods in the rough gave a tensile strength test from seventy-five to ninety thousand pounds while the 1 1-2 inch bars were turned down to half an inch, and gave a tensile strength test from forty-five to fifty-six thousand pounds. Both 1-4 inch rods and 1 1-2 inch bars were cast from the same crucible at the same time under the same conditions, this proving that the strength of aluminum bronze is largely in the skim of the casting. I may say also there are many unscrupulous makers of brass castings who are selling what they call 10 per cent aluminum bronze, which, if put to the test, would prove wanting, and if asked to produce a genuine 10 per cent aluminum bronze casting of any size or weight, say twenty pounds, could not possibly do it at any price.

JAMES CHALMERS.

The History of a Tramp Molder.

W. EDWARD.

CHAPTER XXVI.

I met Mitchell and Barnett that night at the bridge approach by agreement and, after an introduction to the latter, we adjourned to Fred Pettker's place at Eighth and O'Fallon, for a quiet talk. As something in the nature of a lubricant is necessary for good talking I ordered the drinks and both of my companions surprised me by calling for soda, assuring me, when I offered a remonstrance, that they never drank anything stronger. Mitchell then called for the cigars and we sat down at a table to talk when the proprietor, to whom I had been introduced, followed us over and asked what we would have on him.

We had not been seated long when Julius Smith, the foreman of the Fulton, came in with Frank Sullivan. We were all invited to have something, introductions followed and I began to think that the St. Louis molders were pretty decent fellows. I was very favorably impressed with both Smith and Sullivan, and was surprised to learn that the latter was a molder, or rather had been, as he was then superintendent for an asphalt paving company, as from his speech and general bearing I inferred that he belonged to one of the learned professions; and, indeed, there was little enough to show that he had spent the best part of his life in the sand heap. I have always contended that if good qualities are inherent in a man they will come to the surface no matter what his station in life, and all of the education and fine clothes which money can buy will not make a gentleman of one who is at heart a snob. Sullivan was a well

read man and a capital story-teller. He, like myself, had roughed it some in his time and he had a number of tales to tell of his hobo days in the south. He amused me by one story in particular, that of a molder's picnic which had been held some years before in St. Louis. The picnickers had been on the ground long enough to be feeling pretty good, and the bar was receiving a fair share of patronage. John Robinson, the foreman, whom I had worked for at Carondelet, had his family there and the dinner was spread out on the grass, to which the elite of the gathering had been invited, when a fight started at the bar and grew until there were thirty or more mixed up in it, and they fought all over the ground, finally coming to a stand on top of "old" John's spread, kicking up mustard bottles, pieces of ham, biscuits, loaves of bread, dishes and anything they could lay hands on to throw at each other, and, needless to say, completely spoiling the dinner and throwing a damper on the enjoyment of the hungry guests.

We left Pettker's and visited several other places, finally winding up at Tony Faust's, Sullivan and Smith leaving us there for home. After a short talk it was agreed that I should go out to Duetroe's next morning and see "Billy" Brockman, with instructions to say who sent me. I went round to a window in the foundry, however, and got one of the core boys to call Brockman and tell him I wanted to speak to him. When "Billy" came to the window I explained my errand and he told me to wait until noon and then come into the shop, saying he would do the best he could for me. I started off for a walk, as I didn't want to hang around in that vicinity all morning, when I saw about a dozen fellows sitting in the flask yard. I thought by their looks they were molders, and in the crowd I recognized "Sport" Tunnecliff, who told me they were all waiting around trying to get their time.

At noon I went into the shop and saw Brockman, who invited me to share his lunch, but I declined and we sat there talking until the foreman, Harry Graff, came in, when "Billy" introduced me, and I tackled him for a job. He told me to come on in the morning, and when I went to work he put me on a floor beside Henry Widman on locomotive work. Duetroe's is a very large foundry, in fact, there were two foundries and Jack Cunningham had charge of what they called the Wabash shop. They done some pretty good work there, the "heavyweights" being Charlie McKenna, "Old" Joe Burns, Gus Wamhoff, Brockman, Jake Nave and Mike Connors.

Harry Graff, in my estimation, was a most admirable foreman, and a man who could get the best work out of the men, because he treated them like men, and not as if they were merely human machines, or brutes. He was the nicest and most gentlemanly foreman I had ever worked for, and I was not a little sorry to learn that he was going to leave on the first of the month. His admirers chipped in, and I volunteered my contribution, although it was not solicited, to present him with a handsome gold watch. Mike Connors made the presentation in a neat little speech, in which he took occasion to point out that Graff's style of running a shop was appreciated by the molders, and so long as he continued to treat the men under him as gentlemen, he could expect like treatment in return. I was always opposed to giving boss's presents, as, unfortunately, in too many cases they are not deserved, but on this occasion I thought it was merited. If there were more foremen like Harry Graff there would be fewer hobos on the road, and fewer still of the kind that a carpenter would call "jacklegs."

"Bill" Wakefield was superintendent of the place, and after Graff left George Conway run it for a week, then a fellow named Summers, from Chicago, took charge, quite the antithesis of Harry Graff. A gang followed him from the "Windy" City, and he soon began to weed out the old men to make place for them. I didn't like his looks and made up my mind that my time would be very short there. One day I had in a locomotive boiler front, on which I had a bad lift, and just as I was clamping up he walked over and asked if I thought it was a day's work. I replied that, all things considered, I had done a fair day's work, but if he was not satisfied he could give me my time, which he did without any further words. I knew he had one of his pals ready to replace me, and he was simply giving me a show to quit before he found an excuse to fire me. It was only a few days until Jack Cunningham was let out of the Wabash

shop, and Andy Wakefield, a brother of the superintendent, took his place.

When I got my time I went down and saw "Billy" Mitchell, but they were still slack at Zimmerman's, and he steered me up to Allen's. I talked to Andy McKillops through the "dog" shop window, and he told me that they were very slack and were laying off men, so I went over to the Standard and struck "Jack" Vincent for a job. He told me to come on in the morning and he put me to work on Hooker's pump work, which was principally dry sand. Vincent had the reputation of being a tough man to work for, but I got along with him all right, because most of his time he was engaged in swearing at the Poles, Hungarians and Germans, who formed the bulk of the force. In fact, there were only six of us who used the English language, the rest jabbered away in some foreign lingo, and it reminded me of Bowler's shop in Cleveland.

Jake Dillman was working there at the time and he came all the way up from Carondelet to work in that "slaughter-house." Everything in green sand had to be bedded in the floor, because there wasn't a bottom board around the place and old Alex Kilpatrick was too stingy to buy lumber. However, this didn't bother me, as the few weeks I was there I worked on dry sand, but in my mind this is poor economy. Most any molder who has had any experience prefers to work in a shop where they follow this system, as the work is necessarily easier, but when the boss begins to count the cost in most cases it will be found much cheaper to buy bottom boards.

I worked there about six weeks, but I got tired of my surroundings and, wanting to get into a better shop, I quit and went down to Allen's to strike Julius Smith for a job. He knew me at once, shook hands and asked where I had been working, then told me that they were quite busy on heavy work and, if I wished, I could start in the morning. When I started in he doubled me up with Luke Lamb on a piece for a cotton press—here was another molder I struck who was strictly temperate—and when our job was out I was doubled with Jeff Wheatley on a bed plate. It was a pleasure to work with this young fellow—he was only a boy—but one of the neatest and best mechanics I ever saw for one so young. He carried every detail of the most intricate job in his head and never slighted any part of the mold, or struck two blows with his rammer where one was sufficient. There are artists in every trade, but they are born and not made and Jeff Wheatley had the true artistic instinct in his composition. Nearly all of the molders who worked in Allen's at that time, including Julius Smith, had served their time there, and as a body of all around workmen they were a credit to the shop.

When the rush on big work began to slacken I was put out in the "dog" shop on a side floor. In here were Martin Manning and his dutiful son, Johnnie; Jimmie Lamb, Mike Feeney, Pete Silvers and Andy McKillops. This was the greatest aggregation of jokers I ever run across and they occasioned as much fun as a minstrel show. From morning until night the "dog" shop was one continual round of laughter, with Martin Manning as the central figure and joker in chief. Martin had all of an Irishman's love for a good story, plenty of native wit and a fund of anecdote which seemed almost inexhaustible; besides, he was possessed of an "elegant brogue" which added much to the drollery of his stories, while his quick wit and ready reparte always threw the joke aimed at him upon some one else. Although an old man of nearly sixty years the nomadic spirit of his youth had never been extinguished and almost every spring he would take the road for a few months until his longing was appeased, when he would gravitate back to St. Louis. Johnnie, his son, while not possessing the ready wit of his father, possessed many of Martin's characteristics, chief among which was his love of the flowing bowl, and his fondness for travel. In consequence, Johnnie always had some difficulty in holding a job over payday, and spent more of his time in looking for work than in working. The last time I had seen him before coming to St. Louis was when I was working down in Springfield. One morning Johnnie came into the shop looking as if he had dressed himself from some farmer's scare crow. He had a gaiter on one foot, a boot on the other, a long-tailed Prince Albert coat buttoned all the way up, covering a very dilapidated pair of trowsers, minus the seat, and hid the fact of his having no shirt, while an old

straw hat with only part of the rim left completed his make-up. In fact, he was so naked that when Jack O'Neil took pity on him and gave him a job some of the boys had to loan him clothes enough to present a decent appearance in the shop.

All of the boys in the "dog" shop were Brotherhood men and I finally gave the committeeman my initiation fee and asked him to propose my name for membership at the next meeting of No. 40.

(Continued.)

Notice.

Advertisements entitled Situations Wanted, or Situations Vacant will be inserted in this col. mn One Insertion FREE. All others, 25 cents per line.

FOR SALE—No. 3 Root blower, used only few months; to be replaced with largest size. Address box 4, care THE FOUNDRY PUBLISHING CO.

WANTED—A position by a Foundry foreman, ten years' experience on machinery and general jobbing work. Best of references. Address J. M., box 27, The Foundry.

WANTED—Position by a practical, up-to-date foundry foreman; knows how to govern men; 17 years' experience as foreman; distance no object. Address B., box 5, Roslyn, Pa.

WANTED—First-class molder as foreman of foundry working about ten men; must be up to date and a hustler; state experience and reference. Address box 22, care THE FOUNDRY PUBLISHING CO.

WANTED—Position as foundry foreman; would like to correspond with any firm in states or Canada who are in need or are thinking of changing foreman. Address box 19, care THE FOUNDRY PUBLISHING CO.

FOUNDRY FOREMAN desires to make a change; can give best of references; age 33 years; experience on light and heavy machinery and architectural iron work. Address box 20, care THE FOUNDRY PUBLISHING CO.

A PRACTICAL FOUNDRYMAN with 25 years' experience and a thorough knowledge of loam, dry and green sand molding, and capable of handling men to the best advantage, desires position; best of references. Address J. S., box 25, care THE FOUNDRY PUBLISHING CO.

WANTED—By a thoroughly up-to-date foundryman, position as superintendent where a thorough knowledge of mixtures, ability to overcome difficulties and good executive ability would be appreciated; have no objection to a tonnage contract; 27 years' experience in actual shop practice; A1 references, salary moderate. Address box 24, care THE FOUNDRY PUBLISHING CO.

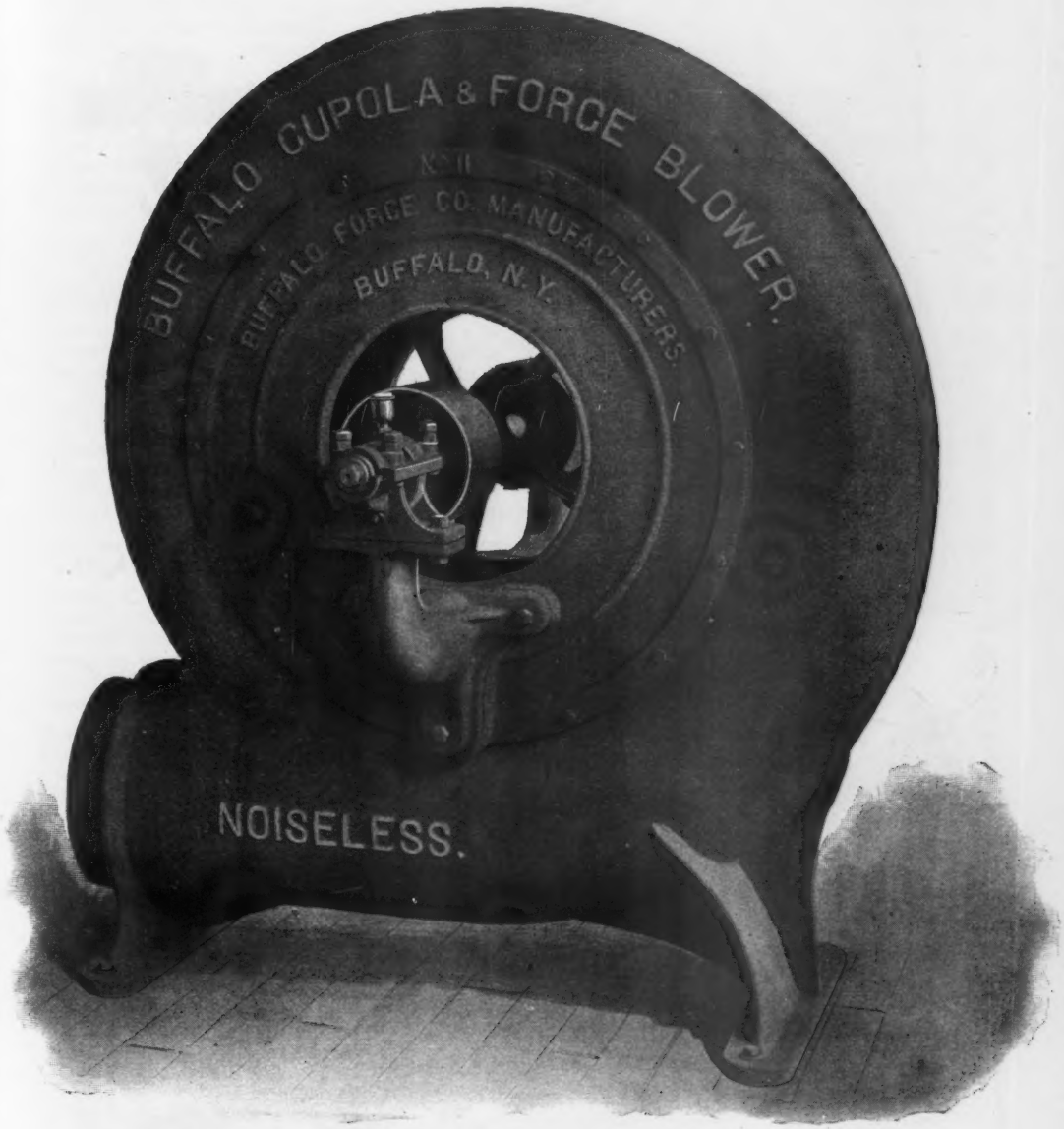
WANTED—Partner in one of the best equipped plants in the south for general machine and contract iron work. Shipping facilities exceptionally good, by rail or river. A splendid opportunity for a thoroughly practical man, who understands making estimates, and handling men. A close investigation of the above is requested, if interested. Address for plan of works, and full information, "PARTNER," care The Foundry, box 29.

WANTED—By a foundryman 39 years of age, 19 years' experience, 10 years as foreman and superintendent, a position in either capacity; practical experience on all kinds of light gated work and machinery and architectural work up to 6 tons, the use of molding machines, as a melter and mixer of irons, with a fair knowledge of chemistry of irons; good references. Address box 23, care THE FOUNDRY PUBLISHING CO.

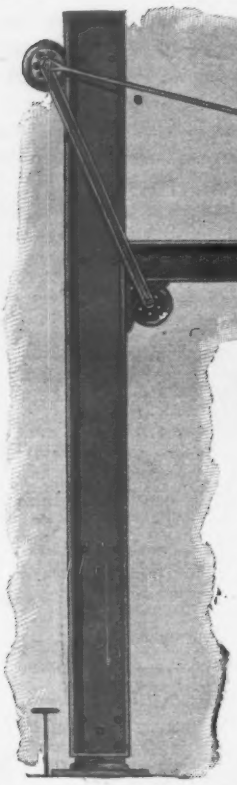
WANTED—By Foundryman of experience, thoroughly posted in loam and dry sand; a position in charge of a Foundry doing a good class of work. Understands mixing iron and handling men to advantage. Address E. B. G., box 28, care The Foundry.

FOR SALE, TRADE OR RENT—Foundry and machine works, in Des Moines, the manufacturing and geographical center of Iowa. Old established business and no incumbrances. Shops all fully equipped and in best of condition. Large stock of patterns for general manufacturing. Des Moines offers exceptional railroad facilities and cheap fuel. This plant is offered much below its value. Best of reasons for selling. For particulars address S. D. WILSON, 223 E. 1st street, Des Moines, Ia.

FOR SALE—At a very great loss to close up an estate. In order to close up the estate of Mr. Huntington Beard, we offer for sale a first-class foundry and machine shop plant, consisting of a machine shop 30x60, three stories high, with a complete set of iron and wood-working tools and machinery; foundry 60x80 feet, with first-class equipment; fire-proof pattern building, 30x30 feet, three stories high, containing a very large stock of most desirable patterns; also blacksmith shop, storehouse, japanning building and office building; both steam and water power; located on the West Shore Railroad and Erie Canal, eight miles from Syracuse, N. Y. This is just the plant for manufacturing hardware specialties, and it can be bought for about one-quarter of its cost. For further information address the Estate of Huntington Beard, Fayetteville, N. Y.



Furnished with Combined Adjustable Bed and Countershaft where desired.



DO YOU NEED CRANES?

WE MAKE CRANES

. . . . ASK FOR OUR PRICES ON CRANES

With our special tools we make **Flange Pipe** at low cost. Let us name you prices when you require . . . . .

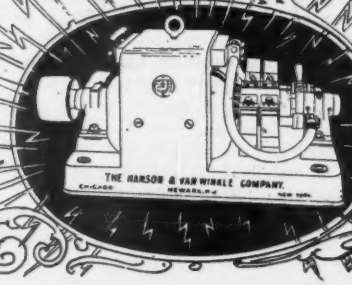
HUB OR FLANGE PIPE AND FITTINGS.

We may be able to supply them to you at less than your cost. . . . . .

The Addyston Pipe and Steel Co.

CINCINNATI, OHIO.

NICKEL-PLATING OUTFITS



THE
HANSON & VAN WINKLE
—COMPANY.—
NEWARK, N.J.
CHICAGO. NEW YORK.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page	per month,	$20.00
Half page	"	12.00
Quarter page	"	7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates .thus giving it to all alike, and no reduction of any sort on the abov rates can be made.

Copy for advertisements should be in by the 25th of the month preceding publication.

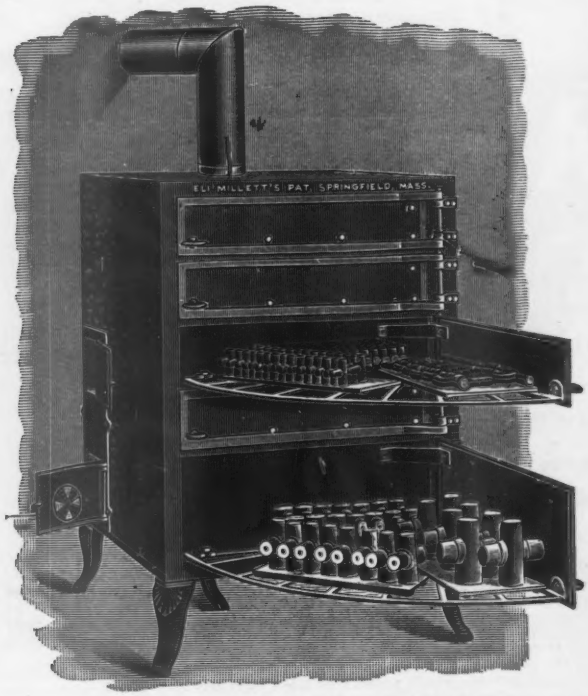
All Moulders Should Have Them

RUBBER TIPPED
FOUNDRY RAMMERS
FOR FLOOR OR BENCH.

They do not mar or break the patterns. Their use also often saves time, as less care is needed for the patterns, and care means time and money. The moulds are as good and require as little venting as moulds made by ordinary rammers. We believe they are superior in these respects. Some who use the rubber tips think they save labor, as they tend to lift the Rammer at the beginning, the hardest place in the backward part of the stroke. However this may be, they certainly save patterns. Try them.

PRICE of Floor Rammer, 85c.
Bench Rammer, 70c..
Handles included.

Brown & Sharpe Mfg. Co.,
PROVIDENCE, R. I.



Millett's Patent Core Oven

THE BEST IN THE WORLD.

No Foundry using small Cores can afford to be without it.

Over one hundred and fifty in use.

SEND FOR OUR NEW CATALOGUE GIVING NAMES OF THOSE USING THEM.

Millett Core Oven Co.
BRIGHTWOOD, MASS.

For Sale by J. W. PAXSON & CO. Philadelphia, Pa.

BUYERS' DIRECTORY.

ALUMINUM.
Cowles Electric Smelting & Aluminum Co., Lockport, N. Y.

AIR HOISTS.
Whiting Foundry Equipment Co., Harvey, Ill.

BARROWS, TRUCKS, ETC.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Lansing Wheelbarrow Co., Lansing, Mich.
Syracuse Chilled Plow Co.

BLOWERS.
Buffalo Forge Co., Buffalo. N. Y.
Connersville Blower Co., Connersville, Ind.
Garden City Fan Co. Chicago, Ills.
Root, P. H. & F. M. Company, Connersville, Ind.
Sturtevant Company, The B. F., Boston, Mass.
Wilbraham Baker Blower Co., Philadelphia, Pa.

BRONZES.
Cowles Electric Smelting and Aluminum Co., Lockport, N. Y.

CHARCOAL.
Springfield Facing Co., Springfield, Mass.

COKE.
Washington Coal and Coke Co., 7 Wood St., Pittsburg, Pa.

CORE COMPOUNDS.
American Glutrose Works, Philadelphia, Pa.
Stewart, W. H., 182 Front St., New York.
Vreeland Tompkins, Jersey City, N. J.

CORE OVENS.
Millett Core Oven Co., Brightwood, Mass.

CORE OVEN CARS.
Lansing Wheelbarrow Co., Lansing, Mich.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Foundry Outfitting Co., Detroit Mich.
Whiting Foundry Equipment Co., Chicago.

CRANES.
Addyston Pipe and Steel Co., Cincinnati, O.
Craig Ridgway & Sons, Coatesville, Pa.
Harrington, E., Sons & Co., Philadelphia, Pa.
Phœnix Iron Works Co., Cleveland, Ohio.
Shaw Electric Crane Co.
Wm. Sellers Co.
Whiting Foundry Equipment Co., Harvey, Ill.

CRUCIBLES.
Joseph Dixon Crucible Co., Jersey City, N.J.
McCullough-Dalzell Co, Pittsburg, Pa.
Taylor Crucible Co., Robt J., Philadelphia, Pa.

CUPOLAS.
Foundry Outfitting Co., The, Detroit, Mich.
Springfield Cupola Co., Springfield, O.
Whiting Foundry Equipment Co., Harvey, Ill.

FIRE-BRICK.
Brooklyn Fire Brick Works, Brooklyn, N. Y.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Paxson, J. W., & Co., Philadelphia, Pa.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.

FLEXIBLE SHAFTS.
Stow Flexible Shaft Co., Binghamton, N. Y.
Chicago Flexible Shaft Co., Chicago, Ill.

FOUNDRY LADLES.
Foundry Outfitting Co., The, Detroit.
Obermayer Company, The S., Cincinnati, Ohio.
Paxson & Co., J. W., Philadelphia, Pa.
Phœnix Iron Works Co., Cleveland, Ohio.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whiting Foundry Equipment Co., Harvey, Ills

FOUNDRY PLANS.
Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ills

FOUNDRY SUPPLIES.
Cleveland Facing Mill Co., Cleveland O.
Springfield Facing Co., Springfield, Mass.
Foundry Outfitting Co., The, Detroit, Mich.
Joseph Dixon Crucible Co. Jersey City, N J.
J. S. McCormick Company.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Paxson & Co., J. W., Philadelphia, Pa.
Smith Foundry Supply Co., Cincinnati, O.
The U. S. Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., New York.

IRON BUILDINGS.
Berlin Iron Bridge Company, East Berlin, Conn
Wrought Iron Bridge Company, Canton, Ohio.

IRON FILLER.
Vreeland Tompkins, Jersey City, N. J.

MANGANESE AND SILICON.
Cowles Electric Smelting and Aluminum Co., Lock port, N. Y.

MOLDING MACHINES.
Tabor Mfg. Company, 39 Cortlandt st., New York.
The Adams Co., Dubuque, Ia.

MOLDING SAND.
E. M. Ayers, Zanesville, O.
Foundry Outfitting Co., The, Detroit.
Garden City Sand Co., Chicago, Ill.
Paxson & Co., J. W., Philadelphia, Pa.
Whitehead Bros. Co., New York.

NICKLE PLATING OUTFITS.
Hanson & Van Winkle Co., Chicago.

PATTERN MAKERS.
The Gobeille Pattern Co., Cleveland, Ohio.

PATTERN MAKERS SUPPLIES.
Frank H. Clement Co., Rochester, N. Y.
The J. A. Fay & Egan Co., Cincinnati, Ohio.

PLATERS SUPPLIES.
Hanson & Van Winkle Co., Chicago.

POLISHERS SUPPLIES.
Hanson & Van Winkle Co., Chicago.

SAND SIFTERS.
Wm. Sellers & Co., Philadelphia, Pa.
Taylor, Wilson & Co. Allegheny, Pa.

SAND BLAST.
Goodrich, & Co., F. A., Detroit, Mich.

SNAP FLASKS.
Diamond Clamp & Flask Co , Richmond, Ind.
Green & Co., C. H., Syracuse, N. Y.

SPRUE CUTTERS.
Gould & Eberhardt, Newark, N. J.

TROLLEY TRACKS.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.

TUMBLING BARRELS.
Brown & Sharpe Mfg. Co., Providence, R. I.
Paxson & Co., J. W., Philadelphia, Pa.
Stover Mfg. Co., Freeport, Ills.
Whiting Foundry Equipment Co., Harvey, Ills.

VENTILATOR IRONS.
Delvin, Thos. & Co. Philadelphia, Pa.

Lansing Hand-Made Scrap Iron Barrow.

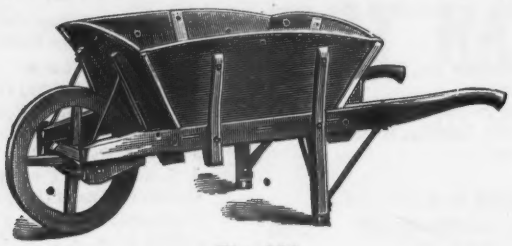


Fig. 238.

This barrow is made for heavy work in and about foundries, rolling mills, machine shops, etc. and is made of the very best seasoned timber. Handles are made of 2 x 3 in. white oak; box is made of 1¼ in. maple. Size of box at top, 26 in. wide at wheel end, 30 in. wide at handle end, 34 in. long. Has a heavy wheel 19 in. in diameter, 1¾ in. tread, and has ¼ in tire; we put heavy iron bands on the ends of the hub. Weight of barrow is 125 lbs. Has iron bands on ends of legs and all iron braces are of ⅝ in. round iron. All irons are bolted.

Telegraph name, Seacoast.

WRITE FOR PRICES.

We make a Specialty of Steel and Wood Barrows for Foundries.

LANSING WHEELBARROW CO., LANSING, MICH.

AIR * COMPRESSORS

IN FOUNDRIES

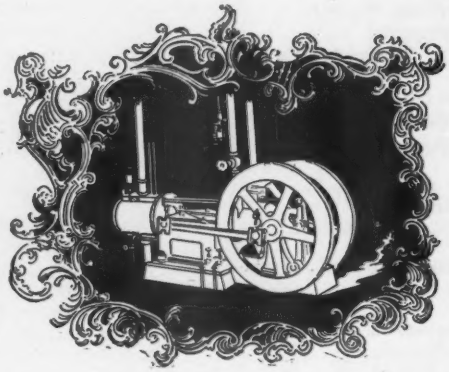
High Grade Compressors

Steam or Belt Driven

Manufactured by THE

Ingersoll-Sergeant Drill Co.

Havemeyer Building, New York.



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WORK WONDERS

USED FOR

Sand Blasts

Lifting Castings,

Placing Cores in Position, etc.

"Columbus" Steel Tubular Wheelbarrow.

Made throughout of the best quality of high grade steel. Tray stamped without joint, seam or rivet, with edge bound over steel rod. Handles, Legs and Wheels the strongest put upon Tubular Barrows.

Made in nine different sizes. Largest manufacturers in the United States of TUBULAR BARROWS, STEEL CHARGING BARROWS and WOODEN BARROWS of every variety. Write for catalogue to

The Kilbourne & Jacobs Manufacturing Co.

LINCOLN STREET, COLUMBUS, OHIO.

STOVER'S IMPROVED

EXHAUST TUMBLING BARREL

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

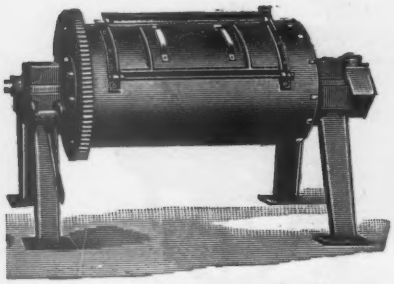
For full particulars, address,

Stover Manufacturing Co.

205 RIVER STREET,

FREEPORT, ILL

SEVERAL PEOPLE . . .



Responded to our last card on the subject and have since

TUMBLED

Their Castings by our Improved Method, much to their satisfaction and profit.

You are in business for Profit, and money saved is money earned.

Send for Catalogue of our IMPROVED MILLS.

CLEVELAND NICKEL WORKS,

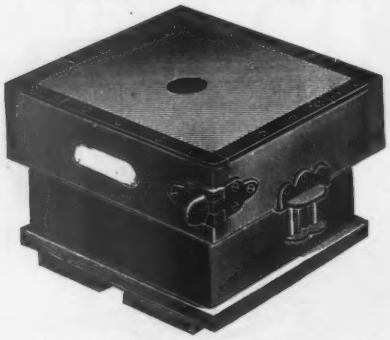
CLEVELAND, OHIO.

MANUFACTURERS OF

IMPROVED TUMBLING MILLS and STOVE RODS, SCRAPERS, POKERS, TOWEL RODS and NICKEL PLATED STOVE TRIMMINGS.

Boutelle's Improved Snap Flask

FOR HEAVY WORK.



PATENTED JULY 17, 1894.

NO STRAINING OF WORK.

SAVES Floor Space SAND TIME MONEY

Send for Circulars and Price List.

L. W. BOUTELLE,

ORANGE, MASS.

Eberhardt's Patented Sprue or Gate Cutter

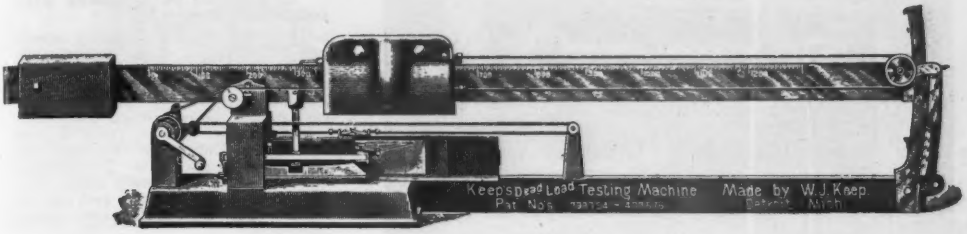
Dear Sir:—The machine fills the bill; am just delighted with it. Yours truly, Maryland Brass & Metal Works, Baltimore, Md.

Price Low

Send to

GOULD & EBRHARDT, NEWARK, N. J.

"Keep's Test" Apparatus.



HERE IS WHAT ONE LARGE CONCERN SAYS:-IT HAS PAID THEM, WHY NOT YOU?

DETROIT, MICH., March 31st, 1896.

Mr. W. J. Keep, City:

DEAR SIR: We have regulated our foundry mixture by "Keep's Test" during the past year, and can recommend it in highest terms. We know exactly what we are doing and can keep our castings of uniform quality. We find that .160 inches per foot the best shrinkage, and have been able to keep the average strength of a test bar ½ inch square and 12 inches long at 450 pounds.

Very truly yours,
LELAND & FAULCONER MFG. CO.,
H. M. LELAND, Vice-President.

To SAVE MONEY IN YOUR OWN FOUNDRY, ADDRESS **W. J. KEEP, Detroit, Mich.**

90 Heats

That's what some of the

HUSSMAN CRUCIBLES STAND

NOW! A few years ago, could not say so truthfully. We defy competition in quality and durability. We use Choicest **CEYLON PLUMBAGO** hence can sell you the best for Facings.

Try us. Send for testimonials.

HUSSMAN CRUCIBLE CO

810 Commercial Bldg., ST. LOUIS, MO.

STOW MF'G. CO.

BINGHAMTON, N. Y.

INVENTORS AND MANUFACTURERS OF THE

STOW FLEXIBLE SHAFT

—FOR—

PORTABLE
DRILLING
TAPPING
REAMING
WOOD BORING
EMERY GRINDING
BICYCLE DRILLING, ETC.

PORTABLE EMERY GRINDER

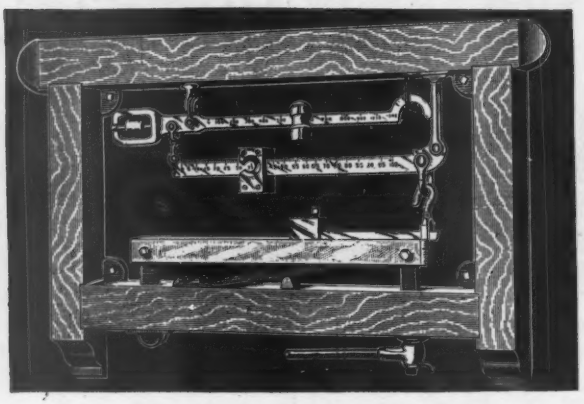
This tool is almost indispensible for cleaning and grinding heavy castings, buffing and polishing all metals and glass. It runs Emery Wheels, either flat or on edge. Hundreds in use giving perfect satisfaction.

General European Agents,
SELIG SONNENTHAL & CO,
85 QUEEN VICTORIA STREET,
LONDON, ENGLAND.

Write for Catalogue and Price List.

SPERRY'S TESTING MACHINE

For showing Transverse Strength of Foundry Test Bars.



If you are interested in Testing Machines (an Iron Founder cannot afford not to be) we wish to show you what our machine will do for you.

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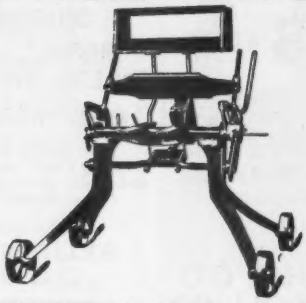

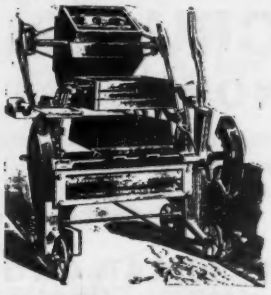

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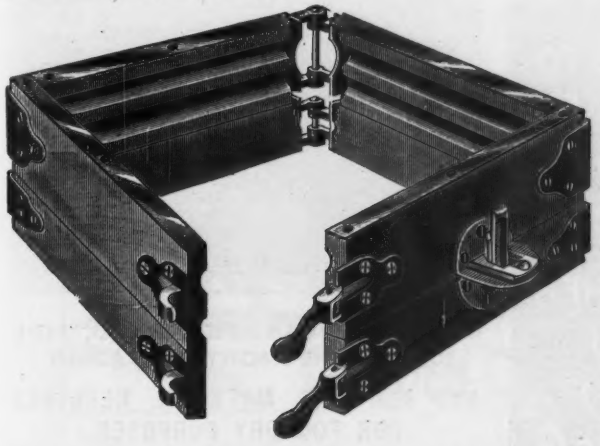

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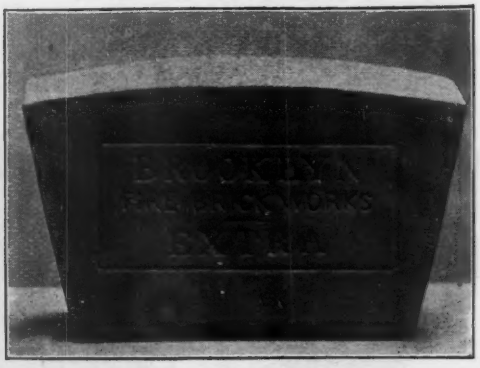

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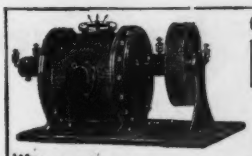

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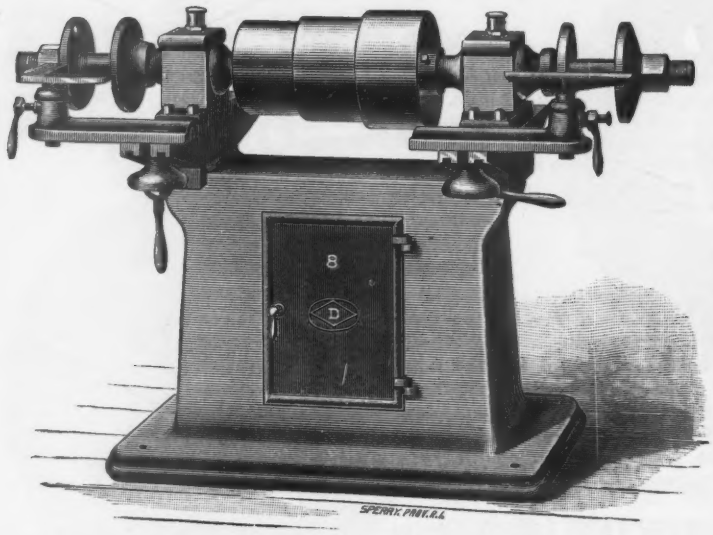

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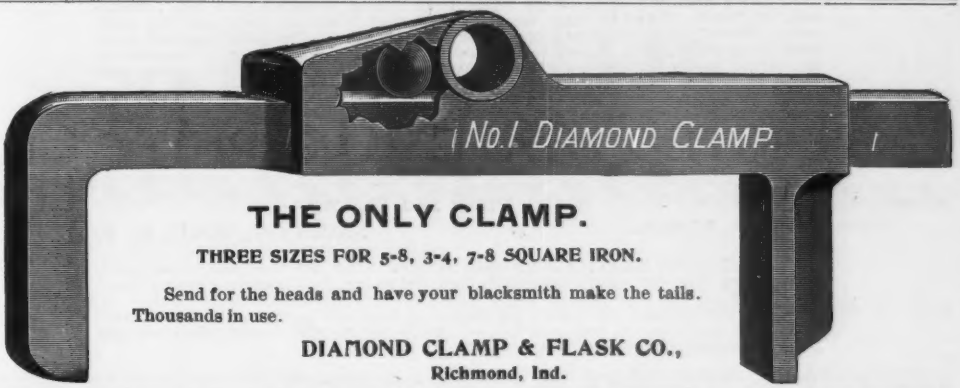

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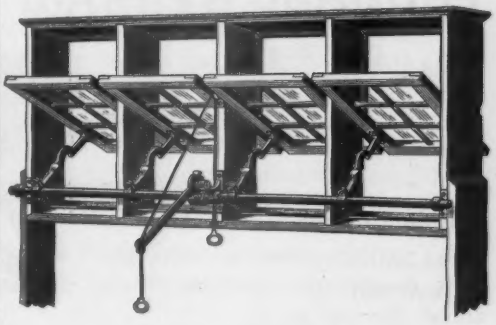

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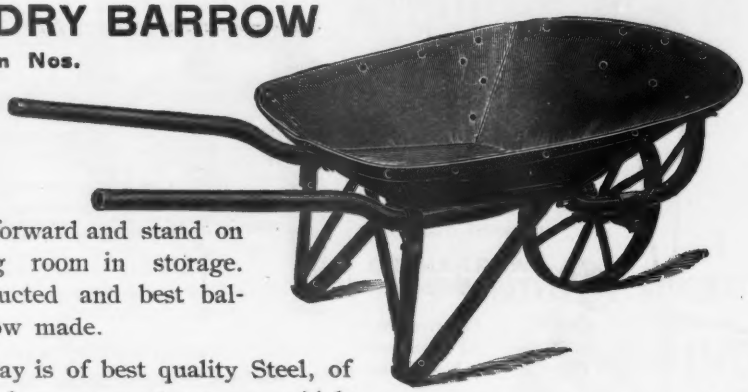

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